Naval Surface Warfare Center
Carderock Division
West Bethesda, MD 20817-5700

NSWCCD-65-TR–1998/23 April 1999

Survivability, Structures, and Materials Directorate

Technical Report

Fatigue Strength and Behavior of Ship Structural Details

by

David P. Kihl

NSWCCD-65-TR–1998/23 Fatigue Strength and Behavior of Ship Structural Details

19991105 115

Approved for public release; distribution is unlimited.

DEPARTMENT OF THE NAVY

NAVAL SURFACE WARFARE CENTER, CARDEROCK DIVISION
9500 MACARTHUR BOULEVARD
WEST BETHESDA MD 20817-5700

9110
Ser 65-74
11 May 99

From: Commander, Naval Surface Warfare Center, Carderock Division
To: Commander, Naval Sea Systems Command (SEA 03R3)

Subj: FATIGUE STRENGTH AND BEHAVIOR OF SHIP STRUCTURAL DETAILS

Ref: (a) Program Element 0603563N, Reliability-Based Structural Design, Milestone V1, Subtask HD, Project S2196

Encl: (1) NSWCCD-65-TR–1998/23, *Fatigue Strength and Behavior of Ship Structural Details*

1. Reference (a) requested the Naval Surface Warfare Center, Carderock Division (NSWCCD) to formulate probability-based design criteria for welded steel structures. Enclosure (1) presents results of an experimental and analytical effort to characterize the fatigue strength of ship structural details.

2. Comments or questions may be referred to Dr. David P. Kihl. Code 653; telephone (301) 227-1956; e-mail, kihl@dt.navy.mil.

J. E. BEACH
By direction

Copy to:

COMNAVSEASYSCOM WASHINGTON DC
[SEA 03H, 03H3, 03H3 (Engle), 03P, 03P1, 03P1 (Kadala, Nappi, Sieve), 03R, 03R1 (Hough, Webster)]

DTIC FORT BELVOIR VA

NAVSURFWARCEN CARDEROCKDIV
BETHESDA MD [Codes 3442 (TIC), 60 (w/o encl), 601, 65, 65R (2), 651, 653 (10), 653 (Kihl), 654, 654 (Melton)]

Naval Surface Warfare Center
Carderock Division
West Bethesda, MD 20817-5700

NSWCCD-65-TR–1998/23 April 1999

Survivability, Structures, and Materials Directorate
Technical Report

Fatigue Strength and Behavior of Ship Structural Details

by
David P. Kihl

Enclosure (1)

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY ***(Leave blank)***

2. REPORT DATE
April 1999

3. REPORT TYPE AND DATES COVERED
Final

4. TITLE AND SUBTITLE
Fatigue Strength and Behavior of Ship Structural Details

5. FUNDING NUMBERS
PE 0603563N

6. AUTHOR(S)
David P. Kihl

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Naval Surface Warfare Center
Carderock Division
9500 MacArthur Boulevard
West Bethesda, MD 20817-5700

8. PERFORMING ORGANIZATION REPORT NUMBER
NSWCCD-65-TR–1998/23

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Commander
Naval Sea Systems Command (SEA 03R3)
2531 Jefferson Davis Highway
Arlington, VA 22242-5160

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT ***(Maximum 200 words)***

This report presents results of an experimental and analytical effort to characterize the fatigue strength of ship structural details. Test results are analyzed and compared with other data and fatigue details from various design codes. The comparisons presented allow one to determine the relative fatigue strength of different details, whether they originate from test data or design codes. The comparisons are made at low fatigue cycle levels, high fatigue cycle levels, 50 percent (mean) probability of failure and 2.3 percent (design) probability of failure. In addition to the comparisons, the fatigue strengths are ranked from weakest to strongest to allow further assessments to be made. The test data generated under this and other efforts are used to compare predicted and experimental fatigue lives where the detail was subjected to variable amplitude loadings.

14. SUBJECT TERMS
ship structures   structural fatigue   reliability

15. NUMBER OF PAGES
251

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	SAR

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18
298-102

Table of Contents

Table of Contents (con't)

Figures

Tables

ADMINISTRATIVE INFORMATION

The work described herein was performed by the Structures and Composites Department, Code 65, of the Survivability, Structures, and Materials Directorate at the Naval Surface Warfare Center, Carderock Division (NSWCCD) under the sponsorship of the Naval Sea Systems Command (SEA 03R3). This report is submitted in partial fulfillment of Milestone V1, Subtask IID of the Reliability Based Structural Design Program PE0603563N, Project S2196.

ACKNOWLEDGEMENTS

The author would like to express his gratitude to the following individuals who contributed to this effort; Messrs. M. Sieve and N. Nappi, Jr., from NAVSEA 03P who assisted in selecting the structural details to be evaluated, Mr. D. McDevitt of the Casde Corporation, W. Whitehead of Ingall's Shipbuilding Division, and those in the Facilities and Model Fabrication Department at NSWC/CD for their effort in fabricating the test specimens; T. Laing of NSWCCD (Code 606) and A. Gray (Code 653) for instrumenting the test specimens and assisting in the experimental effort; and those at The George Washington University who also assisted in testing phase.

EXECUTIVE SUMMARY

This document contains data and analyses compiled over the last few years to support formulation of probability-based design criteria for surface ship structures. Specifically, these results pertain to fatigue strength assessment of welded steel structures. It is expected that the information contained in this report will enable a structural engineer to make educated assessments of fatigue life, fatigue strength, or compare the expected fatigue behavior of a joint detail made using one S/N (applied stress versus cycles to failure) curve versus another.

Throughout this document, stress range is assumed to be the most significant parameter affecting fatigue strength. The constant amplitude endurance limit effect is ignored, both from test data and design codes. The agreement between random test data and predictions, based on a single-line S/N curve, is more favorable than when the endurance limit is included in the predictions. The distribution of Miner's cumulative damage summation constant is shown to have an average value of unity. Further, the use of a mean minus two sigma S/N curve is shown to produce a conservative design against fatigue failures.

Comparisons are made to assess the relative fatigue strength among any of the structural details contained within this document, whether the detail is characterized by test data or by a classification category of a design code. Comparisons are made at low fatigue lives (10^3 cycles), high fatigue lives (10^8 cycles), 50% probability of failure (mean), or 2.3% probability of failure (mean minus two sigma). All details are ranked by fatigue strength from weakest to strongest to allow further assessments to be made.

INTRODUCTION

The U.S. Navy is currently formulating probability-based design criteria for surface ship structures. For decades, surface ship design criteria have been based on a deterministic approach that has served the Navy well. Design against failure by fatigue, however, has been implicit, being controlled by the level of primary design stress limitations that are tied to the type of material used in construction.

Fatigue, and other aspects of the ship design process, have been quite successfully addressed in naval ships, due in part to adequate safety margins, quality of workmanship and the use of high-quality steel and aluminum plates and scantlings. The design process, although deterministic, is also empirically based, having been influenced by operational experience, measurements, and test data. Such an approach works well for conventional monohulls but may not necessarily work as well for more contemporary ship design configurations or major structural modifications and operation of existing ships that deviate markedly from past trends and experience.

Ship design has gradually incorporated probability and statistics, especially for environmental loadings and fatigue strength. More recent ship designs and structural modifications have explicitly addressed fatigue, having been designed to survive a given service life within a specified probability of failure. With a more rigorous probabilistic procedure being developed, the need to characterize the strength and probability of failure of various details becomes necessary.

BACKGROUND

Fatigue strength evaluation has historically been approached empirically. Although research continues at fundamental (and microscopic) levels, the test specimens and configurations used are typically, from a practical structural engineering point of view, less than useful. For structural design applications, especially those that involve welding, fatigue testing of structural details remains the primary source of strength and endurance data. Due to the inherent variability associated with large manually fabricated welded structures, structural testing and statistical analysis comprise the most quantitative approach to fatigue strength at this time. Advances that can readily be applied, tend to come more from experimentally observing behavior under different types of loading or specimen configuration and size, or developing empirical algorithms than from theoretical or "hard science" approaches.

Fatigue strength has become an increasingly important issue with which to contend (SSC, 1998; SSC, 1997). As technology advances, structural designs become more finely optimized. Attempts to reduce weight and cost typically result in decreased amounts of material and lower margins of safety. Actual margins of safety may often be implicite to begin with. Structures are often left in service longer or operated in a different manner from that originally intended. Fatigue is an irrecoverable form of damage, which can initiate cracks prematurely and result in nuisance cracks in secondary structure or lead to more serious situations if they initiate or grow into primary structure.

Once ships are built and outfitted with cabling, piping and ductwork, the outer shell is typically insulated or hidden by false ceilings or walls in manned areas. Periodic

inspections of the outer shell, if performed at all, are difficult. Inspection sites may be physically hard to reach in a large area, especially if the space is poorly lit and cluttered with outfitting. Even if cracks occur, they are likely to avoid detection because they are simply difficult to see.

The naval ship design therefore favors a safelife fatigue approach against crack initiation in ships as opposed to a fail safe damage tolerant approach such as that used to assess assumed crack presence and growth in aircraft. The former approach relies on a comprehensive fatigue analysis to ensure (within appropriate probabilities of occurrence) that the ship can complete its intended mission and service life before the onset of crack initiation. Although conservative, this approach does not rely on period inspection. The later approach relies heavily on inspection, assuming a crack just under the inspection detection capability may exist, grow without inhibiting the performance of the structural member, and be detected and assessed at the next inspection interval.

FATIGUE LOADINGS

Surface ships respond to an active seaway in a relatively narrow frequency band compared to that of the wave heights. Although the bandwidth frequency changes with speed and heading, most ships spend most of their life responding to seaways in a narrow band. Head seas and high speed tend to produce the most narrowband conditions. Whereas following seas and low speed tend to produce the more broadband conditions. Table 1 shows an example of an operational profile, broken down by speed and heading, with the bandwidth for each operating condition reflected by the irregularity factor and

the average encounter frequency. The irregularity factor is the ratio of the average number of peak responses that occur between zero crossings. Irregularity factors of unity indicate narrowband responses, i.e. Rayleigh distributed extrema. As the irregularity factor decreases in magnitude, the process becomes increasingly broadband. Gaussian distributed extrema are obtained when the irregularity factor becomes zero. The encounter frequencies are included in the same format to show the range and magnitude of the wave induced hull girder response frequencies as this typical ship encounters waves.

The bandwidth of the ship response is a fairly important issue. If the operating conditions produced responses that were not narrowband, then the distribution of stress cycles would be difficult to define. Although the ramifications of ignoring the frequency content of the responses have been investigated (Sarkani et al, 1991), this topic remains the basis for future work. The relationship between the statistics of the responses and the distribution of stress cycles remains to be established for the general case. Only in the limiting case of narrowband responses has a direct relationship been established, i.e., Rayleigh distributed stress cycles. The more general case may involve the use of Weibull probability distribution functions, but must be related to Rainflow stress cycles and not simply stress peaks. In the meantime, ship responses are assumed to be Rayleigh distributed for purposes of determining fatigue cycles, calculating fatigue damage and estimating extreme lifetime loads.

Nonetheless, assuming Rayleigh distributed stress cycle responses, lifetime fatigue loadings are typically constructed by breaking the operational profile into cells of constant speed, heading and sea condition (Sikora, 1983). Knowing the time spent in

each of these cells allows one to estimate the number of stress cycles that would occur, the maximum stress level expected to be exceeded once, and the number of cycles expected to exceed a given stress level. By combining the cycles exceeding given values of stress for all the cells making up the operational profile, one can construct a table of stress exceedances associated with many stress levels. Typically, these pairs of data are fit to a Fourier sine series expansion for ease of computation. To develop a lifetime stress histogram for fatigue calculations, the exceedance curve is divided into segments. The difference between cycles exceeded is the applied cycles, and the corresponding stress values are averaged to determine the applied stress. The exceedance curve approach is a spectral method that can be used on many types of ship responses, including bending moments and motions. The exceedance curve approach continues to be the method of choice in fatigue assessments of ship structures (Kihl, 1992).

The shape of the resulting lifetime stress histogram is not unlike that of an exponential distribution. Many times an exponential distribution, or the more general Weibull distribution, is assumed in order to obtain a simple closed form for subsequent fatigue assessments (Munse, 1982). Knowing, or assuming, the number of lifetime cycles and the maximum lifetime stress, allows the determination of the stress level which is expected to be exceeded once in the lifetime of the ship. Knowing these values, the parameters describing the exponential or near-exponential distribution can be defined or assumed. Assuming an exponential lifetime distribution of stress is the same as using a linear exceedance curve. As seen in Appendix A, assuming the lifetime stresses are exponentially distributed can, however, lead to erroneous estimates of fatigue life. Unfortunately the erroneous estimate is not always conservative.

Simplistic approaches (ABS, 1992) offer a quick way to make comparisons or rough estimates of fatigue lives for many ship details. Despite the advantage of a simple expression, a more realistic, accurate, and comprehensive description of lifetime stresses can be produced from the spectral stress exceedance curve method. The uncertainties associated ignoring stress cycles has the potential of rendering a simplistic approach unreliable unless the results are supported by service experience.

The relative importance and effect of variability of the parameters used in a fatigue assessment can many times be unknown or not realized. In an attempt to quantify how these parameters affect the final answer using the exceedance curve approach, a brief sensitivity analysis was performed and is provided in Appendix B. Results of the parametric study indicate that variability in the S/N curve coefficients, the standard deviation, first two coefficients of the exceedance curve and service life produce the most variability in the estimated fatigue life. The results of eliminating the higher exceedance curve coefficients produced little change in the final fatigue life estimate. It should be noted that these trends may not reflect the behavior of all ship types and classes and are only intended to indicate relative importance of parameters.

CUMULATIVE FATIGUE DAMAGE

The concept of cumulative damage considers the gradual irreversible changes that occur as a structure undergoes cyclic operation until the structure can no longer perform satisfactorily. The initial conditions, previously accumulated damage, environment, loading, as well as local and overall geometry, all contribute to the way damage

accumulates in the structure and the rate at which it occurs. The period between which the structure begins cyclic operations and when it can no longer perform satisfactorily, or when failure is said to have occurred, can be expressed in units of applied cycles, or time.

When Palmgren (1924) first studied the wear out of ball bearings, he assumed damage accumulated linearly with the number of revolutions. Miner (1945) later expanded on this idea by assuming that the damage of a fatigue test specimen also accumulated linearly when subjected to a given number of stress cycles. Failure would then occur when the damage reached a critical value; i.e., when the applied cycles reached the cycles to failure, or when the damage summation reached unity. Applying this rationale to two-step and multi-step loadings, the summation of damage fractions was formulated into what we now call Miner's Rule.

Predictions based on Miner's Rule do not always agree with experimental data. Many tests have been conducted using simple block loadings to quantify the appropriate value of the summation constant, or the accuracy of the methodology. Modifications on the linear summation (Frost, 1974) propose a power law relationship between damage and the cycle ratio. Other methods attempted to introduce multiple initiation sites, rotation of constant amplitude stress/life (S/N) curves, or size of imperfections. These alternative methods were developed for block loadings, e.g. considering a few stress levels acting together in some defined sequence. They relied on experimental data to empirically quantify the parameters representing the fatigue behavior. Due to the extremely large number of additional parameters, the cost and effort required to characterize any of these methods under constant amplitude loads would be prohibitive, even for one joint configuration. Additional effort would then be required to apply the

model to random load situations. Random loads must be considered in any ship structure fatigue assessment, since the ship's primary responses are wave induced. Unfortunately, there have not been many tests that used random loadings to evaluate Miner's Rule. The experimental data presented in this report contain both constant and random amplitude data. The random amplitude data are representative of Rayleigh distributed stresses. As such, the summation constant is specifically evaluated. This evaluation will be discussed in greater detail later.

Results, however, indicate the summation constant indeed to be normally distributed about unity when the mean (50% probability of failure) S/N curve is used. When a mean minus two standard deviation (2.3% probability of failure) S/N curve is used, as one would in a design, nearly all of the individual data points fall on the conservative side of the unit summation value. These results indicate successful implementation. However, those few points that fall to the unconservative side are associated with severely deformed or misaligned specimen configurations, indicating a lower probability of failure S/N curve may be more appropriate in such extreme cases.

FATIGUE DAMAGE APPROACHES

There are only a few practical approaches to fatigue crack initiation and fatigue life prediction (Moan, 1997). The differences between these approaches depend primarily on how the experimental fatigue data are generated, characterized and used. The applicability of each method depends on the complexity of the structure, the state of

stress at the point of interest, the type of loading, the ability to identify stress cycles, and the many subtle internal and external features of the joint detail.

The simplest and most straight forward method of life prediction is the nominal stress approach. In this method, only a coarse level of stress analysis is required of the structure. One only needs to obtain the average "far field" stress applied to the detail of interest. Often times, the stress is determined from section properties or a coarse mesh finite element model. Fatigue data are generated from specimens representing the detail of interest and subjected to the same nominal "far field" stress levels. In so doing, a unique S/N curve for that particular detail is established. The subtle features and details of the specimen, such as weld profiles and material properties are assumed to be inherent and contained in both the test specimen and detail of interest. Fatigue design codes use this method, and generally have a family of S/N curves applicable to different categories of details.

The hot spot approach is just the opposite of the nominal stress approach. The success of this method lies in the determination of the local state of stress at the presumed crack initiation site. The "exact" local geometry, i.e., weld profile and toe geometry need not be modeled precisely, but should reflect the general weld configuration in order to accurately define the local state of stress. Fine mesh finite element models or strain gage readings are typically used to define the state of stress, which is often taken a given (small) distance from the weld toe. In contrast to the nominal stress approach, the fatigue specimen configurations used in the hot spot approach are much simplified, since the detail is accounted for more in the stress analysis than in the test specimen.

The notch stress approach relies heavily on stress concentration factors, nominal stress fields, and the presence of a notch assumed to be located at a crack initiation site. Typically, a generic S/N curve is used to determine the stress cycles to failure.

Similar to the notch stress approach, the notch strain approach attempts to define the state of strain at a notch, and therefore uses cyclic strain data on simple notched specimens to determine damage. This method is particularly useful in applications that involve elastic and plastic strain levels.

FATIGUE DESIGN CODES

When structures are expected to experience many cycles of stress reversals during their service life, the design must consider the possibility of failure by fatigue damage accumulation. Codes are now available to assist designers in dealing with fatigue by laying out a procedure of calculations and limits on stress levels to follow. In so doing, an adequate fatigue life is incorporated into the design based on the knowledge and experience of those representing that particular industry.

A review and comparison of several design codes was recently undertaken (Moan, 1997) that is applicable to ship structure. Obviously, those codes which apply directly to welded steel structure are of primary importance.

In situations where the consequences of failure are great, or the structure contains few redundant load paths, the codes tend to be conservative and are based on limiting stress levels. These limit stress levels would correspond to essentially infinite fatigue lives. The resulting designs may not be particularly efficient, but are presumed to be

safe. The subject of structural fatigue, its underlying assumptions and empirical basis, is by no means foolproof. Advances are made periodically and eventually find their way into the design codes. Many codes differ because of the structural application, or the way in which the service loadings are applied, or how they can be quantified for analysis. Stress cycle responses to a random environment, such as a ship would experience, can be much more complicated than cyclic one-way loading of a bridge, or the pressure loading of a tank. Applicability between codes of different industries may not always be straightforward, since the codes are based in part on design philosophy.

In comparing design codes, some common traits are evident. All codes use or are based on an S/N curve of the traditional power law form and use Miner's Rule to account for fatigue damage accumulation. Failure is assumed to occur when the Miner's Rule summation constant reaches unity. Tables 2 and 3 are provided to aid in comparing the different codes. In general, there appears to be a consistent approach to fatigue damage accumulation under non-constant amplitude loads. The differences tend to be associated with use of stress concentration factors, factors of safety, cycle counting, or the data base of S/N curves. A later section of this report discusses a comparison of design code S/N curves and S/N curves obtained from this and other recent experimental efforts.

FACTORS AFFECTING FATIGUE STRENGTH

There are many factors that affect the fatigue strength of welded steel connections. Foremost of these is the applied stress range. The formation of high residual stresses in large, welded structures tends to dominate over the effects of applied

mean stress (Dexter, 1993 and 1994). Fabrication quality and preparation of the pieces being joined together are also important. The presence of embedded flaws (porosity and inclusions), and surface flaws, such as weld toe undercut and misalignment, can significantly reduce the fatigue life of an otherwise intact structural detail. Significant life reduction can also be caused by any intentional or unintentional stress concentration. High levels of tensile residual stress due to uneven cooling during welding or forceful alignment during setup of members can also lead to shortened fatigue life; whether new construction or repair. Operation in a corrosive environment, such as seawater, bilge water, or sour crude oil without adequate cathodic or coating protection can also be detrimental. Size and thickness effects are also an important consideration in fatigue (Kihl, 1997; Maddox, 1991). Fatigue tests on large components and/or full thickness specimens tend to fall in the lower portion of the scatter band of smaller specimens.

Fatigue strength improvements can be realized with the use of shot peening and/or weld toe grinding to reduce stress concentrations and introduce compressive residual stresses. Although useful, these measures would only be taken in fatigue critical regions or as a last resort in fixing a fatigue prone structure.

There are other effects that can influence the fatigue behavior of welded structure, but are associated with the interpretation of the S/N curve and the numerical calculation of the fatigue damage. For instance, the constant amplitude S/N curve has an overall sigmoidal shape, with an upper plateau at stresses approaching yield, the usual center portion used in design, and a lower or endurance portion at low stress levels associated with semi-infinite fatigue life. Problems arise when service stress levels are below that of test data used to construct the S/N curve. Random fatigue test results (Kihl et al, 1992

and Sarkani et al, 1992) support the notion that the constant amplitude S/N endurance limit should be ignored when calculating damage under variable amplitude loadings.

Another problem arises when one determines probability of failure. Probabilities of failure are seldom determined with any rigor. Often, the lack of data leads one to settle for what amounts to the default method of determining S/N curves with a associated probability of failure. That method (ASTM, 1988) consists of performing a regression analysis on the logarithms of the fatigue data and determining the standard deviation of the data from the best fit straight line. The resulting probabilities of this lognormal distribution with constant scatter may very well apply to the data under consideration, or they may not. The point being, that even though this is a fairly accepted practice, the calculated probabilities of failure may not be very accurate. A more rigorous approach would be to establish separate probability distributions (e.g. Weibull or lognormal distribution) at each of several stress levels and connect all the fatigue lives associated with a given probability of failure with an S/N curve. This method would also allow for situations were the scatter is not constant, but increases with decreasing stress.

Finally, test data are generated by cycling specimens or components in load machines until either failure occurs, or the test is suspended without failure. The definition of failure, however, is not always clear. Failure may mean complete separation into two pieces, exceeding a given displacement level, a change in compliance, or a change in correlation coefficient between load and displacement. Whatever the definition of failure during the test, a relationship between that failure and failure in a larger component or full-scale structure must be established. Small specimens may not exhibit much difference between life at first evidence of crack initiation and final failure, where

larger components and structures may exhibit crack initiation and propagation phases as failure approaches. Generally, failure in a test specimen or component is considered to be equivalent to crack initiation in a full-scale structure.

EXPERIMENTAL EFFORT

The focus of this effort was the fabrication and testing of various specimens to reflect the behavior of ship structural details. Fatigue tests were conducted under both constant amplitude and random amplitude loadings. For each type of loading, the configuration could be characterized, and the linear cumulative damage summation constant could be evaluated. The following sections describe the type of configurations characterized, specifics of the tests, data collected, and analyses of the data.

SPECIMEN CONFIGURATIONS

Many different types of structural joint configurations were considered for characterization. Table 4 shows a wide range of possible joint configurations and indicates the ones that were ultimately selected for fatigue life characterization. The configurations ranged in size from small specimens to full-size structural components. They included details such as: insert and doubler plate connections, one-sided welds, aligned and misaligned intersecting plates with partial penetration welds, plates with flame cut edges, opening details, deck to bulkhead plating and stiffener connections, stiffener splices and intersecting plates with full penetration non-load carrying welds with various thickness.

These details were selected to compliment fatigue data obtained from recently completed characterizations (Kihl, 1994a, 1994b) of advanced double hull joint details. These data, together, offer a comprehensive characterization of a wide variety of structural details. Figure 1 shows a general schematic of the test specimens and components. The detailed geometry of these configurations can be found in Appendix C. The newly characterized configurations were all fabricated in a shipyard using high strength low alloy (HSLA-80) steel. The recently generated data on some of the details made of ordinary steel (OS) and high strength (HS) steel are also available and included with the new data for completeness. All specimens were inspected after failure to ensure failure occurred legitimately and not from an unintentional flaw. The large bulkhead penetration details were inspected prior to testing by x-raying the butt weld. Smaller specimens containing butt welds were visually inspected after failure. Finite element models were constructed for each of the small specimen configurations and the opening detail. Table 5 provides a list of stress concentration factors obtained from each of these models. Calculations relating applied load to nominal stress for the spliced stiffener joint detail are provided in Appendix D. The fabrication site, shipyard or NSWCCD, is indicated along with the test results in Appendix E.

STRAIN GAGE INSTRUMENTATION

Only the larger structural components were instrumented with strain gages prior to testing. The larger components included the openings detail, the deck to bulkhead connection (conventional component) and the stiffener splice detail. The number of strain gages varied depending on specimen type. The gage layouts and measurements for

these specimens are shown in Figures 2 through 4. Micro-Measurement strain gage type CEA-06-250UW-350 and M-Bond 200 adhesive were used. Gages were typically placed at weld toes and other areas of high stress concentration. Typically, the strain gages were monitored during the initial installation in order to determine whether or not the test specimens were being loaded evenly when subjected to axial load.

TEST PROCEDURES

The specimen cross sectional area was measured before each test. Applied axial load was then determined by multiplying the desired stress level by the calculated cross sectional area. For the smaller specimens, an average cross sectional area was used. For the deck-to-bulkhead intersection components, average cross sectional areas were calculated above and below the center portion of the component where the simulated bulkhead structure is located, and the minimum cross sectional area was used. Due to the complicated arrangement of the larger opening and stiffener splice components, a nominal cross sectional area was used to calculate the applied load.

All tests were conducted in load control. All specimen were attached to the load machine with hydraulic grips, except for the stiffener splice components which were bolted up to large steel blocks. Prior to the initiation of cycling, the strain gages were monitored while the test components were loaded in steps to their maximum loads. Test specimens without strain gages were not loaded prior to cycling. Cycling continued until the axial compliance of the specimen at least doubled, or the cycle count exceeded twenty million cycles, at which time the test was suspended without failure. Specimens that

failed, usually had developed large cracks. Complete separation would have been expected to occur within a relatively short time.

Loads consisted of both constant amplitude and random amplitude. Both types of loadings had zero mean. The random loadings consisted of a computer simulated sequence of 10,000 endpoints (5,000 cycles) of Rayleigh distributed extrema. The endpoints were connected by haversine curves to produce a continuous waveform of unit RMS. Random loads were produced by multiplying each endpoint of the random load sequence by the product of the desired RMS stress and the average cross sectional area.

TEST RESULTS

Results of the experimental effort were analyzed to produce functional relationships which reflect the fatigue behavior of the joint details. For completeness, data from some recent characterizations have also been included along with the newly generated data. The results of these characterizations are presented in Appendix E.

CONSTANT AMPLITUDE

Random amplitude fatigue test results (Kihl et al, 1992 and Sarkani, et al, 1992) show better agreement with life predictions that use single line constant amplitude S/N curves than those that use bi-linear S/N curves. Constant amplitude fatigue test results were therefore analyzed and fit to a single power law function using linear regression analysis on the logarithms of the applied stress and cycles to failure. This is shown below.

$$N = 10^{\log(A)} S^B$$

The logarithms of cycles to failure were taken as the dependent variables and the logarithms of applied stress were taken to be the independent variables. The scatter in the data about the best fit straight line was quantified by the standard estimate of error, or standard deviation in the log(life) direction, denoted by "$\sigma_{\log N}$". This quantity allows one to determine an S/N curve that would be associated with a value other than the 50% probability of failure represented by the best fit S/N curve. Assuming the scatter to be normally distributed, one can select a given probability of failure from the appropriate number of standard deviations above or below the mean S/N curve. For example, one standard deviation below the mean line corresponds to a 15.9% probability of failure, two standard deviations corresponds to 2.3%, and so on. All S/N curves developed in this manner lie parallel to the mean 50% probability of failure S/N curve.

To implement this procedure, the log(A) parameter is adjusted by adding or subtracting the product of the number of standard deviations from the mean and the value of the standard deviation, as shown in the following example for a mean minus two sigma, or 2.3% probability of failure S/N curve. The slope of the S/N curve, B, remains unchanged.

$$\log(A)_{2.3\%} = \log(A)_{50\%} - 2\sigma_{\log N}$$

Note that, since the standard deviation is taken in the log(life) direction, its value is independent of the units of applied stress. The value of log(A) however, does depend

on the units and definition of applied stress, i.e. single amplitude, double amplitude (range), ksi, or Mpa. Table 6 is used to convert between the different notations.

The coefficient of variation (COV) is a useful measure of comparing the dispersion of data sets. The COV is calculated by dividing the standard deviation by the mean value of the data. When applied to the best fit S/N curve from constant amplitude data, the COV is constant at any point along the S/N curve, assuming the standard deviation is constant in log space, which is consistent with the procedure discussed previously. This being the case, it can be shown that the COV and the standard deviation obtained from the S/N curve are related by the following expression.

$$COV = 1 - \frac{1}{10^{\sigma_{\log N}}}$$

The constant amplitude fatigue data, regression analysis results and COV are provided for many detail configurations, including those characterized under this effort, in Appendix E.

RANDOM AMPLITUDE

At least one set of random amplitude test data was generated for each type of structural detail. Often, a detail characterization contained a few such sets, depending on the number of specimens available and the type of material. The experimental data were used for comparison with analytical predictions. The geometric mean of the fatigue lives was calculated for each set and compared with fatigue life estimates using the Rayleigh Approximation Method (Miles, 1954). The Rayleigh Approximation is derived based on

the assumptions that the stresses are Rayleigh distributed, the S/N curve is of the standard power function form (single straight line S/N curve), and that the fatigue damage accumulates according to Miner's Rule.

All these assumptions apply to the types of loading, analyses, and procedures used in this investigation. The Rayleigh Approximation formula is given below.

$$N = \frac{10^{\log(A)}}{\sigma^{-B} 2^{-B/2} \Gamma(1 - B/2)}$$

In this expression, log(A) and B are the empirical coefficients of the S/N curve, $\Gamma(\bullet)$ is the gamma function and σ is the root mean square (RMS) stress of the zero mean process. The RMS stress can be determined in several ways depending on how the stresses are presented. If the stresses are presented in the frequency domain by a power spectral density curve, then the RMS stress can be determined by taking the square root of the area under the curve. In the time domain, the RMS stress can be determined by first squaring all the values in the time history, then summing all the squared values, dividing by the number of values, and finally taking the square root of the mean squared value. If the stress is defined by a probability function, then the RMS stress can be determined by first calculating the expected value of σ^2 and then taking the square root of that value. Explanations of how expected value calculations are performed can be found in most probability books (e.g., Newland, 1986). The gamma function can be determined using information provided in Appendix F.

Generally, the comparison between the experimental data and analytical results were quite favorable. Unconservative results typically occurred for configurations that

contained built-in imperfections. A more comprehensive assessment is obtained by analyzing the ratio of the experimental to analytical fatigue lives. This is analogous to adjusting the summation constant in the linear cumulative damage procedure to obtain accurate predictions. The random amplitude data can also be found in Appendix E.

Note that expressions for estimating the cycles to failure when the stress are distributed according to other probability distributions can be derived using the moments of probability distributions (Lipson, 1973 and Bogdanoff, 1985) provided in Appendix G. These moments are also useful to evaluate how well simulated sequences of random numbers agree with their theoretical counterparts.

SUMMATION CONSTANT

Whether performing analyses to estimate the fatigue life of ship structure in years or calculating the expected cycles to failure of fatigue test specimens, Miner's summation constant provides a measure of the accuracy of the prediction when compared to actual fatigue failure lives. In this role, it can also provide a convenient means to introduce a factor of safety, or compensate for an otherwise quantified inaccuracy.

However, to strictly assess the accuracy of Miner's Rule, predicted fatigue lives can be compared to experimental fatigue lives. To be consistent, if a mean fatigue S/N curve is used in the predictions, then an average experimental fatigue life should be used in the comparison. The database provided in Appendix E contains both the constant amplitude S/N curve coefficients and results from the random amplitude tests. The random amplitude tests were all conducted using stress histories having Rayleigh

distributed extrema. This being the case, the Rayleigh Approximation equation was used to predict the average fatigue life for each random test condition. The geometric mean of the random amplitude test results was determined for each data set. The assessment was then performed by calculating the ratio of average experimental fatigue life to average predicted fatigue life for each data set. Figure 5 shows the overall distribution and frequency of these ratios. Data and calculated ratios used to generate this curve can be found in Appendix H. The most frequent ratio is unity, and the distribution is somewhat symmetric and centered on this value. This analysis indicates the use of Miner's Rule in fatigue life prediction generally produces accurate results. Non-conservative results, those located below unity, tend to occur for details which contain imperfections and misalignments, or larger components. Conservative estimates, located above unity, tend to occur for better quality and smaller specimen configurations.

To assess how these results would reflect a design situation, the following analysis was also conducted. In the case of a design application, a lower probability of failure S/N curve is used, typically mean minus two standard deviations (2.3% probability of failure), to minimize failure of any structural elements. The Rayleigh Approximation equation was again used to predict fatigue life, but this time using the 2.3% probability of failure S/N curve. Ratios were again calculated, but this time using individual (data point) fatigue lives. Figure 6 shows the ratio distribution now shifts dramatically to the conservative (right) side of unity, reflecting the fact that the vast majority of specimens should not, and do not, fail at their predicted (design) fatigue life. Data used in this plot can also be found in Appendix H. Again, only a few individual

specimens, out of over one hundred, are below unity, indicating that a few failures would have occurred in service.

Overall, the methodology for cumulative damage calculations under random loads tends to work well and provides reasonably accurate fatigue life predictions. Further, the use of this methodology for design, using a mean minus two standard deviation S/N curve tends to perform equally as well.

S/N CURVE STRENGTH COMPARISONS

The variety of S/N curves established from data or from fatigue design codes are not always easy to compare, especially if the slopes of the S/N curves are different. To alleviate this problem and facilitate comparison, the S/N curves used in this report were analyzed in several ways. Using the Rayleigh Approximation method, the RMS stress associated with low cycle fatigue loadings (10^3 cycles) and the RMS stress associated with high cycle fatigue loadings (10^8 cycles) were calculated for each S/N curve. The RMS stress is used because of terms in the Rayleigh Approximation formula which include the slope of the S/N curve. If all the S/N curve slopes were the same value, i.e., -3, then the ratios could be evaluated simply using stress range from the constant amplitude S/N curves. Since this is not the case, and because the Rayleigh Approximation formula better represents the random service loadings, RMS stress is used to establish the strength ratios.

The ratio of fatigue strengths is calculated by first solving for the RMS stresses from the Rayleigh Approximation formula associated with a given cycle count (10^3 or 10^8 cycles) and given probability of failure (50% or 2.3%) for each constant amplitude

S/N curve. Each RMS stress is then divided by the RMS stress of the S/N curve selected as the baseline (each S/N curve, in turn, is selected as the baseline) to establish the strength ratios. The resulting strength ratios are presented as tables in Appendix I. The unshaded rows correspond to low cycle fatigue ratios and shaded rows correspond to the high-cycle fatigue ratios. This same series of calculations was performed using both the mean S/N curves (50% probability of failure) and, where data permitted, the mean minus two standard deviation S/N curves (2.3% probability of failure). Both test data S/N curves and design code S/N curves were included in these calculations.

Each value in the first column corresponds to a different S/N curve, the strength of which serves as the baseline (denominator in the ratio calculations) for that entire row. To aid in comparing strengths between entries in different tables, e.g. different probabilities of failure, the last row and column correspond to a generic S/N curve.

For example, consider the need to estimate the high cycle fatigue strength ratio between a conventional component (data set #21) at 50% probability of failure and that of a one-inch thick cruciform joint (data set #7) at 2.3% probability of failure. Since different tables are involved, the generic S/N curve is used as an intermediate step. First, look up the strength ratio at 10^8 cycles for the conventional component (detail #21 column) using the generic S/N curve, "detail" #30 (row), as the baseline on the 50% probability of failure table. The number found has a value of 1.26. This number is the ratio of detail #21 strength at 50% probability of failure and 10^8 cycles to detail #30 strength at 50% probability of failure and 10^8 cycles. Next look up the strength ratio at 10^8 cycles for the generic S/N curve ("detail" #30) using the one-inch thick cruciform (detail #7) as the baseline in the 2.3% probability of failure table. The number found has

a value of 1.7. This number is the ratio of detail #30 strength at 2.3% probability of failure and 10^8 cycles to detail #7 strength at 2.3% probability of failure and 10^8 cycles. Since (only) the generic S/N curve has the same strength in both tables (same log(A), B and zero standard deviation, i.e., the RMS stress of detail #30 at 50% equals RMS strength of detail #30 at 2.3%), the product of the two ratios, 2.14, is the ratio of relative strength between the two details at 10^8 cycles. The conventional component at 50% probability of failure is therefore found to be 2.14 times stronger than the one inch thick cruciform at 2.3% probability of failure under high cycle fatigue conditions. Since the tables also contain S/N curves from design codes, comparing fatigue strength between different codes or between codes and test data S/N curves can be performed in a similar manner.

To provide another means of comparing fatigue strengths of different details and S/N curves, all the strength ratios were ranked from weakest to strongest, using the generic S/N curve for the baseline. The ranking was performed separately for both low-cycle fatigue, high-cycle fatigue, 50% probability of failure and 2.3% probability of failure. Results of the ranking can be found in Appendix J.

There are also occasions when the effect of specimen thickness needs to be considered in the fatigue strength. The method proposed by Maddox (1991) has been shown to work quite well for some of the new test results (Kihl and Sarkani, 1997). The method uses the ratio of old and new thickness and the slope of the S/N curve, and can determine the new value of log(A) associated with the new thickness. An example of this calculation is provided in Appendix K.

Misalignment can also affect fatigue strength. Stress concentration factors associated with plating misalignment (ABS, 1992) can be used to adjust the S/N curve of an "aligned" structural detail in an attempt to account for misaligned plating. This adjustment is performed in much the same way as plating thickness effects. Sample calculations are also provided in Appendix K.

CONCLUSIONS AND RECOMMENDATIONS

The technical issues and experimental work discussed in this report are part of an on-going effort to understand fatigue damage accumulation in welded steel structures and use empirically obtained data and experience to successfully design against failure brought about by fatigue crack initiation. This document reflects current knowledge and understanding of practical fatigue damage accumulation prediction in welded steel structures. It also discusses practice and problems associated with analyzing and applying empirically generated data toward the fatigue assessment/design of surface ship structure.

The data and methodologies contained within offer a complete collection of information that can readily be used by the practicing structural engineer or naval architect in assessing fatigue strength in ship structure or comparing fatigue strength of welded details and design codes. It is recommended that this information be consolidated and expanded appropriately to form fatigue design guidance for surface ship structure.

It is further recommended that efforts be initiated to benchmark the fatigue design methodology by analyzing surface ships that have successfully completed their service

life without fatigue crack initiation. This effort would allow appropriate operational profiles and/or factors of safety to be defined which, when applied, would result in ship designs having adequate fatigue strength.

Future efforts should also include quantifying the fatigue behavior and design of ship structure subjected to axial in-plane and lateral out-of-plane loadings. Such loadings are produced when local secondary hydrostatic loads interact with the primary hull girder bending loads or when the structure subjected to in-plane loads contains out-of-plane deformations.

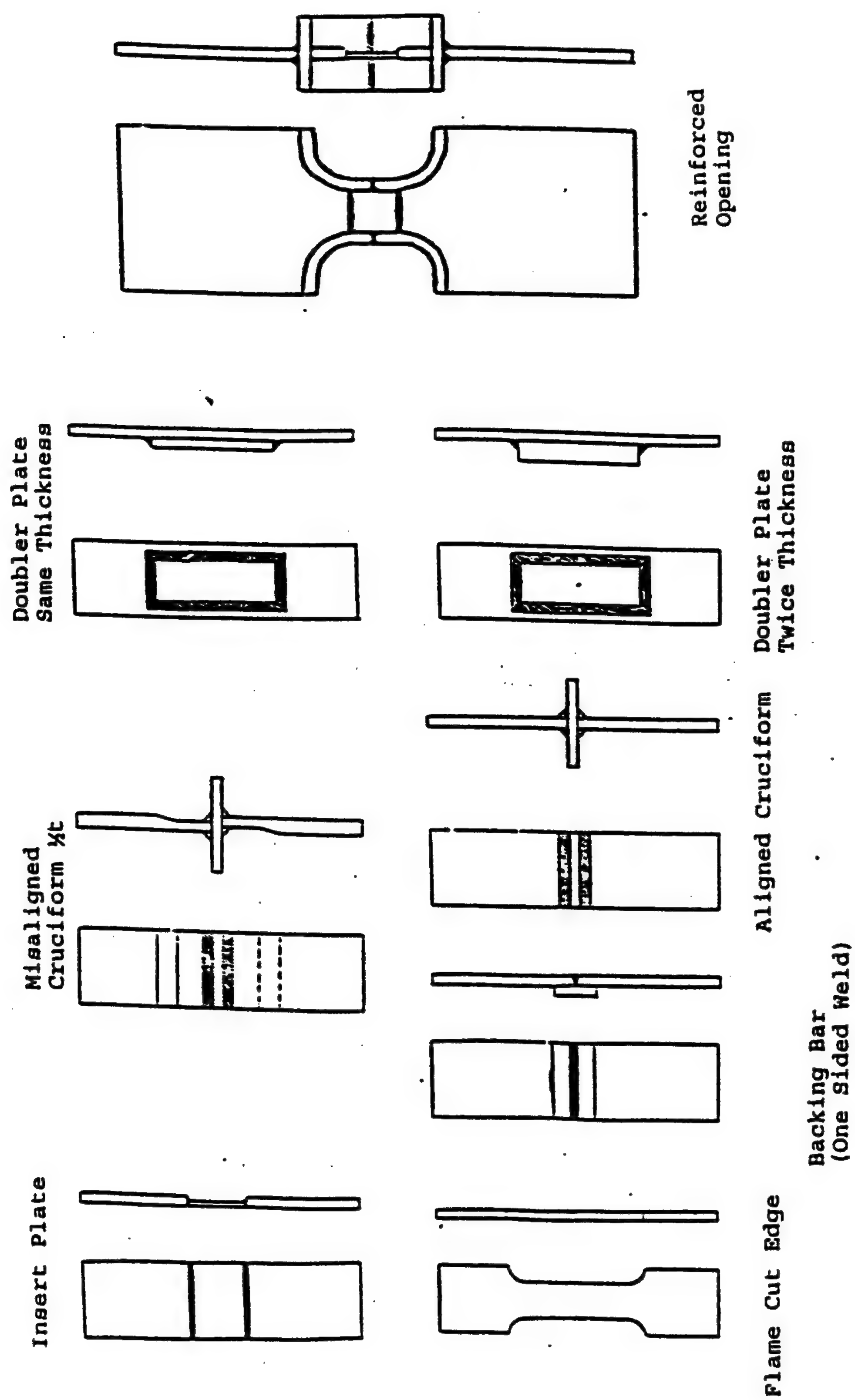


Figure 1 – General Configuration of Test Specimens and Components

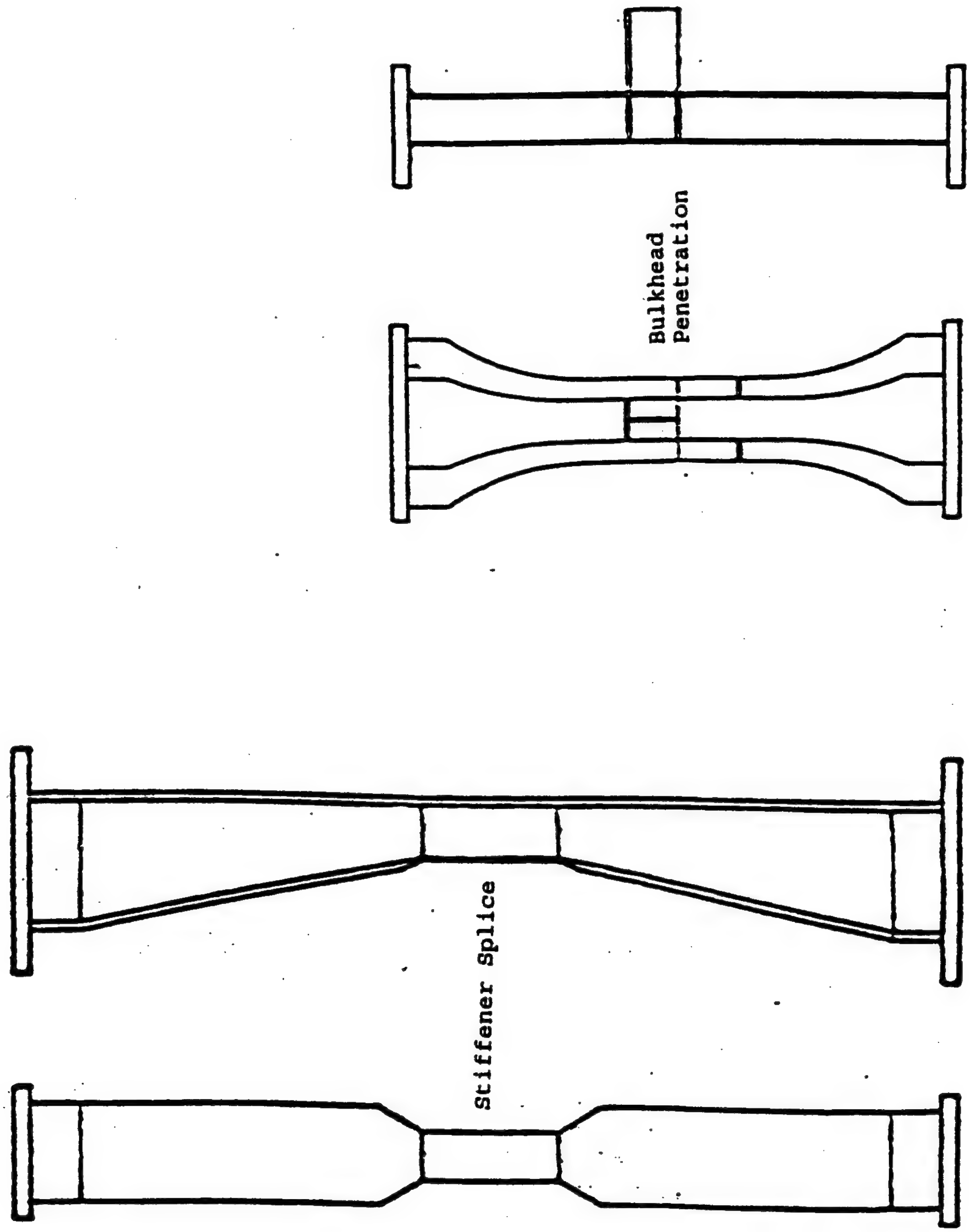


Figure 1 (con't) – General Configuration of Test Specimens and Components

Opening Detail Strain Gage Measurements

Specimen ID	Stress (ksi)	Load (kips)	Gage #1	Gage #2	Gage #3	Gage #4	Gage #5	Failure Cycles	Failure Site
OPEN17	5	19.38	156	169	210	228	242	9,357,300	ins plt butt weld
OPEN18	5	19.38	161	167	212	215	219	1,469,400	ins plt butt weld
OPEN19	5	19.38	181	176	228	233	236	2,988,900	ins plt butt weld
OPEN20	5	19.38	181	200	224	220	226	2,860,800	ins plt butt weld
OPEN07	7.5	29.06	260	232	331	343	324	452,800	ins plt butt weld
OPEN10	7.5	29.06	236	232	333	321	335	575,500	ins plt butt weld
OPEN11	7.5	29.06	264	237	337	337	334	818,700	ins plt butt weld
OPEN12	7.5	29.06	245	243	336	345	352	1,155,400	ins plt butt weld
OPEN02	10	38.75	384	302	421	488	293	328,000	ins plt butt weld
OPEN04	10	38.75	361	374	463	479	433	198,700	ins plt butt weld
OPEN05	10	38.75	400	427	468	427	457	179,200	ins plt butt weld
OPEN06	10	38.75	299	296	433	437	467	409,900	ins plt butt weld
OPEN01	15	58.13	564	503	681	662	658	47,900	ins plt butt weld
OPEN03	15	58.13	662	489	682	658	718	88,400	top of coaming
OPEN08	15	58.13	464	512	661	685	714	91,200	top of coaming
OPEN09	15	58.13	442	530	728	675	654	68,400	ins plt butt weld
OPEN13	5 rms	77.50	633	709	906	942	955	887,000	ins plt butt weld
OPEN14	5 rms	77.50	688	705	841	900	935	663,200	ins plt butt weld
OPEN15	5 rms	77.50	618	669	882	886	892	708,800	ins plt butt weld
OPEN16	5 rms	77.50	624	626	827	878	857	429,100	ins plt butt weld

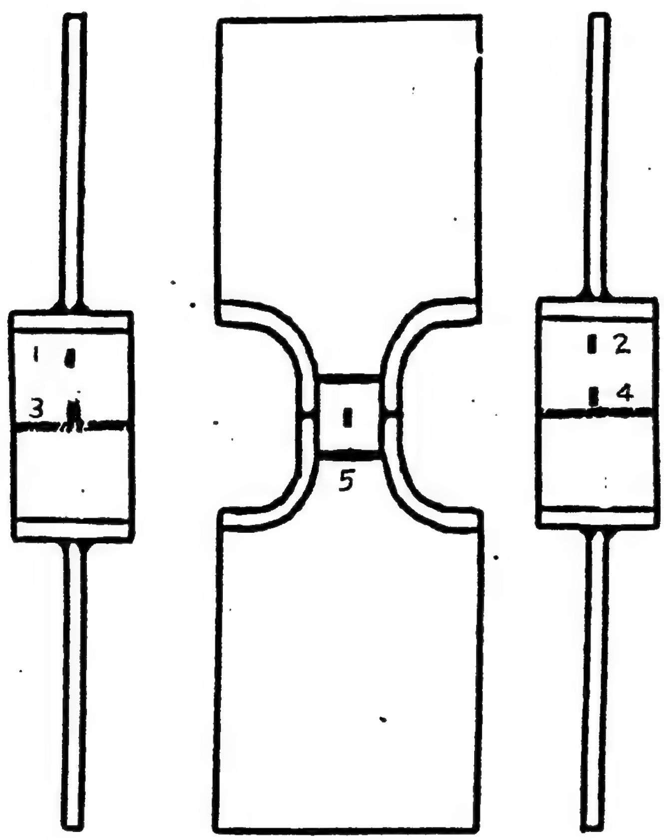


Figure 2 – Strain Gage Layout and Data for Opening Detail

Conventional Component Strain Gage Measurements

Specimen ID	Stress (ksi)	Load (kips)	Gage #1	Gage #2	Gage #3	Gage #4	Gage #5	Gage #6	Gage #7	Gage #8	Gage #9	Gage #10	Failure Cycles	Failure Site
BHD24	7.5	21.14	247	274	311	262	328	282	271	319	292	304	20,752,200	suspended
BHD19	8.5	24.74	319	261	302	353	334	337	349	325	309	321	3,397,800	bhd plt dk plt
BHD09	8.5	24.87	286	274	355	354	350	310	326	321	335	340	2,049,800	bhd flg dk flg
BHD36	8.5	23.97	256	265	316	393	319	337	381	358	367	412	2,422,300	bhd plt dk plt
BHD18	8.5	24.07	208	333	337	359	379	385	371	345	338	352	2,094,000	bhd plt dk plt
BHD15	8.5	24.50	306	316	337	349	389	372	406	362	351	378	3,755,300	toe bracket
BHD01	10	29.39	295	254	443	361	395	373	351	406	347	350	1,912,300	bhd flg dk flg
BHD04	10	27.52	273	275	412	373	372	403	357	357	421	368	1,513,000	bhd plt dk plt
BHD20	10	28.38	409	309	357	324	392	429	452	376	380	373	975,600	butt weld
BHD21	10	28.21	432	436	332	380	426	399	390	457	426	402	2,303,500	butt weld
BHD32	10	28.78	368	327	685	382	406	417	389	366	363	381	2,026,100	bhd plt dk plt
BHD13	15	42.98	479	639	592	591	587	575	631	518	540	572	496,000	bhd plt dk plt
BHD41	15	41.94	629	586	610	621	661	666	662	588	611	718	115,200	bhd flg dk flg
BHD40	15	41.96	553	550	531	543	604	599	564	603	591	564	975,600	butt weld
BHD14	15	43.16	506	496	637	654	641	582	603	553	582	552	510,800	bhd plt dk plt
BHD27	15	42.45	489	579	599	535	655	676	615	612	600	614	437,400	butt weld
BHD22	20	58.32	772	648	800	709	856	800	777	868	837	805	154,400	bhd flg dk flg
BHD10	20	58.18	681	859	758	936	718	781	761	768	735	757	184,000	bhd plt dk plt
BHD23	20	56.36	749	653	868	786	783	853	811	780	747	738	211,300	bhd flg dk flg
BHD26	20	54.10	582	477	890	646	781	793	724	733	766	727	156,900	bhd plt dk plt
BHD17	20	55.32	676	605	803	782	756	844	795	758	849	775	216,200	toe bracket
BHD16	5 rms	59.28	563	499	1022	854	909	850	799	786	941	848	4,343,200	butt weld
BHD03	5 rms	59.30	706	644	771	927	826	887	857	797	923	874	2,297,100	bhd flg dk flg
BHD101	5 rms	62.43	662	786	842	941	821	855	888	745	788	821	1,812,100	butt weld
BHD102	5 rms	64.19	861	1016	789	788	853	840	796	747	795	836	2,363,100	butt weld
BHD13	5 rms	63.38	788	841	793	883	892	864	854	789	799	804	2,497,400	toe bracket
BHD05	7 rms	87.10	1081	1077	1056	1230	1294	1342	1239	1078	1092	1358	1,271,900	toe bracket
BHD02	7 rms	87.19	1039	1062	1170	1318	1326	1315	1333	1248	1194	1272	807,000	butt weld
BHD07	7 rms	87.16	991	1160	1272	1229	1363	1372	1324	1263	1242	1246	892,300	bhd plt dk plt

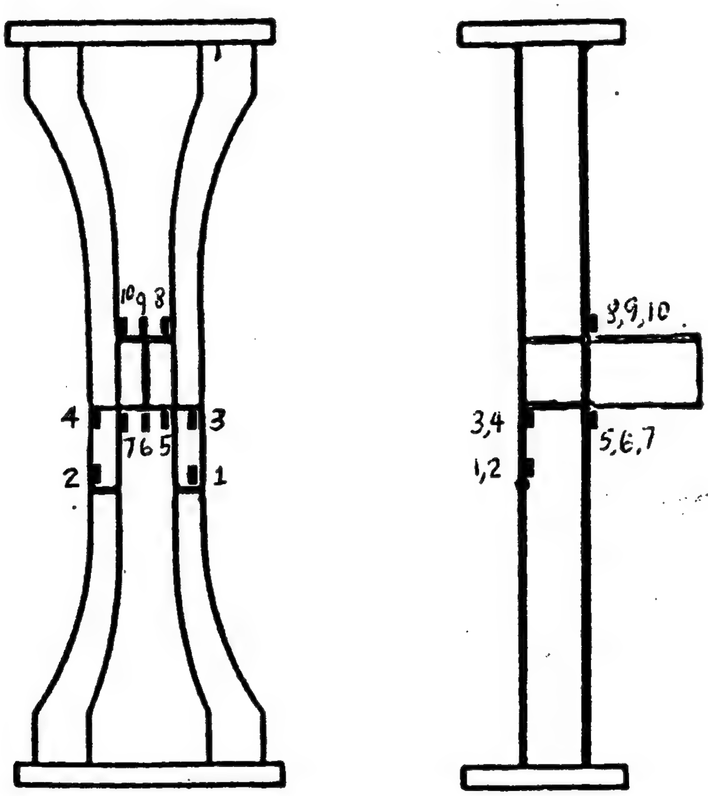


Figure 3 – Strain Gage Layout and Data for Bulkhead Penetration Detail

Stiffener Splice Strain Gage Measurements

Specimen ID	Stress (ksi)	Load (kips)	Gage #1	Gage #2	Gage #3	Gage #4	Gage #5	Gage #6	Gage #7	Failure Cycles	Failure Site
SPLICE05	12	22.74	715	525	610	436	536	694	46	2,717,900	flg @ gage 1
SPLICE19	12	22.74	537	434	494	419	532	636	51	1,013,000	flg @ gage 6
SPLICE17	12	22.74	572	526	687	433	615	567	50	813,200	flg @ gage 1 to gage 3
SPLICE08	12	20.69	545	523	626	398	529	535	49	2,193,700	flg @ gage 1 to gage 3
SPLICE03	15	28.42	782	659	700	558	654	926	61	583,500	flg @ gage 1 to gage 3
SPLICE06	15	28.42	757	619	741	532	770	820	69	776,200	flg @ gage 5 to gage 6
SPLICE04	15	28.42	750	687	724	540	821	740	61	946,300	flg @ gage 1 to gage 3
SPLICE16	15	28.42	657	667	567	562	843	749	56	1,151,600	flg @ gage 5 to gage 6
SPLICE21	20	37.90	729	936	1258	723	902	885	80	196,800	flg @ gage 3
SPLICE23	20	37.90	1028	858	992	725	1089	1111	83	187,800	flg @ gage 5 to gage 6
SPLICE09	20	37.90	831	762	966	703	933	1086	92	396,500	flg @ gage 1 to gage 3
SPLICE22	20	37.90	975	770	942	732	1221	1145	84	199,500	flg @ gage 1 to gage 3
SPLICE12	30	56.84	1712	1344	1514	1120	1568	1489	116	26,600	flg @ gage 1 to gage 3
SPLICE30	30	56.84	1734	1380	1449	1104	1506	1373	115	24,100	flg @ gage 3
SPLICE24	30	56.84	1549	1285	1645	1104	1654	1600	111	43,300	flg @ gage 5 to gage 6
SPLICE13	30	56.84	1760	1458	1612	1160	1430	1519	91	41,700	flg @ gage 1 to gage 3
SPLICE20	7.5 rms	56.84	1515	1294	1306	1120	1535	1528	108	933,000	flg @ gage 1
SPLICE14	7.5 rms	56.84	1625	1329	1494	1085	1577	1727	111	581,700	flg @ gage 6
SPLICE02	7.5 rms	56.84	1440	1303	1649	1105	1548	1666	114	788,800	flg @ gage 1 to gage 3
SPLICE18	7.5 rms	56.84	1500	1317	1370	1123	1628	2484	108	468,500	flg @ gage 6
SPLICE11	10 rms	75.80	1975	1724	2078	1535	2328	2102	143	168,200	flg @ gage 5 to gage 6
SPLICE07	10 rms	75.80	1745	1485	1723	1398	2193	BADGAG	201	59,200	flg @ gage 5 to gage 6
SPLICE15	10 rms	75.80	1943	1642	1958	1509	2135	1878	139	450,700	flg @ gage 5 to gage 6
SPLICE10	10 rms	75.80	2051	1800	2213	1490	2282	2067	135	292,700	flg @ gage 3

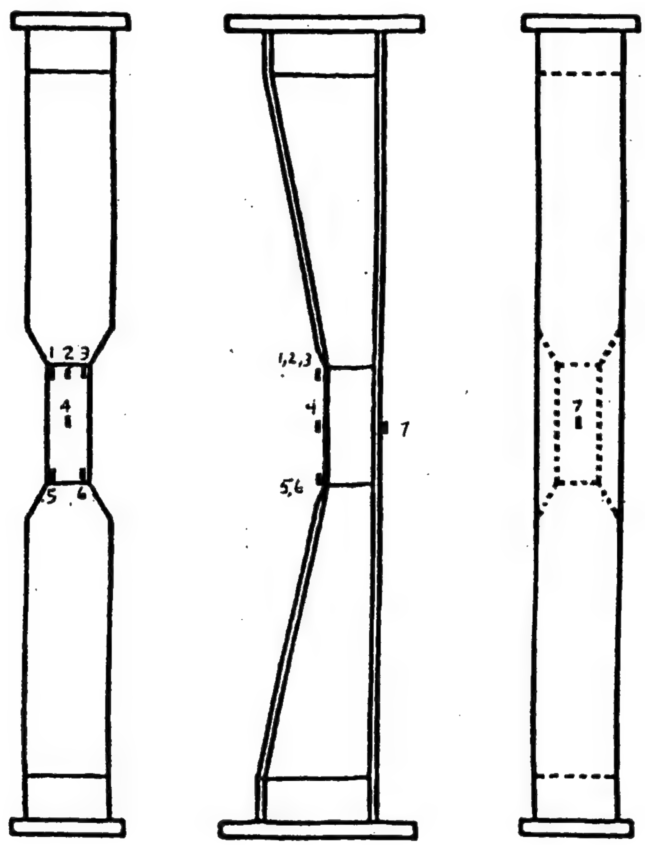
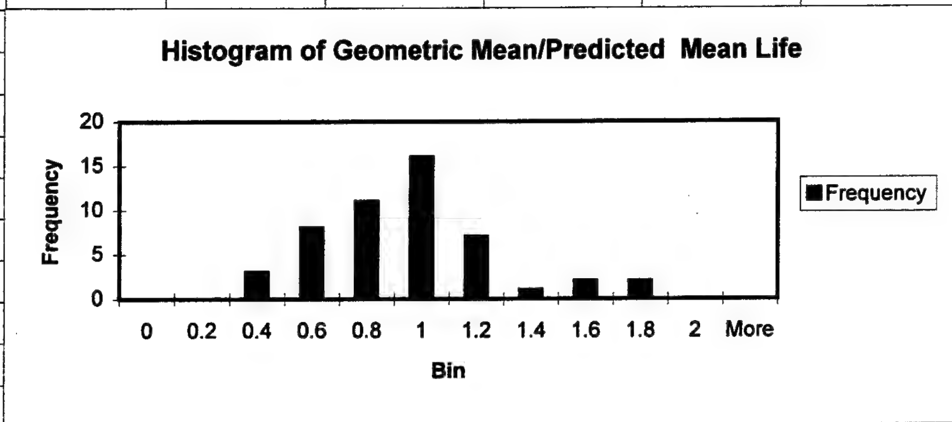


Figure 4 – Strain Gage Layout and Data for Stiffener Splice Detail

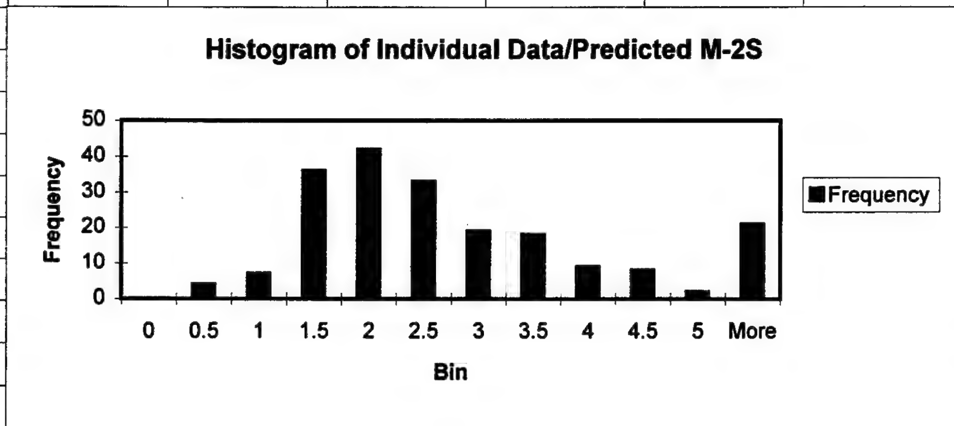
GMean Histogram



Bin	*Frequency*
0	0
0.2	0
0.4	3
0.6	8
0.8	11
1	16
1.2	7
1.4	1
1.6	2
1.8	2
2	0
More	0

Figure 5 – Summation Constant Distribution Based on Average Fatigue Lives

Individual Histogram



Bin	*Frequency*
0	0
0.5	4
1	7
1.5	36
2	42
2.5	33
3	19
3.5	18
4	9
4.5	8
5	2
More	21

Figure 6 – Summation Constant Distribution Based on Individual Fatigue Data

Table 1 – Irregularity Factor and Encounter Frequency as a Function of Operational Profile

MATRIX OF IRREGULARITY FACTOR vs. OPERATING CONDITION

IRREG FACTOR	OPERATING CONDITION HEAD SEAS 5	15	25	BOW SEAS 5	15	25	STRN QTR 5	15	25	FOLL SEAS 5	15	25	SUM	%
0.0-0.1													0	0.0
0.1-0.2												9	9	0.4
0.2-0.3												44	44	2.1
0.3-0.4												108	108	5.1
0.4-0.5												9	9	0.4
0.5-0.6												3	3	0.2
0.6-0.7					4				15			3	22	1.0
0.7-0.8	8				78	23			120	59	2		290	13.7
0.8-0.9	138	142	7	1	93	149			41	117	29		717	33.9
0.9-1.0	30	34	169	175	1	4	176	176			145		910	43.1
													2112	100.0

MATRIX OF AVERAGE ENCOUNTER FREQUENCY vs. OPERATING CONDITION

AVE ENCTR FREQ	OPERATING CONDITION HEAD SEAS 5	15	25	BOW SEAS 5	15	25	STRN QTR 5	15	25	FOLL SEAS 5	15	25	SUM	%
0.0-0.2											3	174	177	8.4
0.2-0.4								176			173	2	351	16.6
0.4-0.6			20	171			176						367	17.4
0.6-0.8	141	22	156	5									324	15.3
0.8-1.0	33	152			107	20							312	14.8
1.0-1.2	2	2			63	151			74	19			311	14.7
1.2-1.4					4	5			85	143			237	11.2
1.4-1.6					2				13	12			27	1.3
1.6-1.8									2	2			4	0.2
1.8-2.0									2				2	0.1
													2112	100.0

(FREQUENCY IN RADIANS/SEC)

Table 2 – Summary of Fatigue Design Code Specifics (from Moan 1997)
(Procedures for Fatigue Assessment of Ship Structures)

Class. Soc.	Reference	Brief description of the scope of the document, applicability and when required.
ABS	ABS (1996a and 1996b)	The fatigue strength assessment is performed in three steps: Step 1 is a designer oriented assessment for connections of longitudinal stiffeners to transverse webs and bulkheads. Step 2 is a simplified fatigue analysis for local hull structures. Step 3 is a comprehensive structural analysis based on spectral approach for details found inadequate in Step 2. The procedure is applicable for tankers, bulk carriers and containerships.
BV	BV (1994)	The aim of the procedure is to 'provide the ship designer with relevant information to asses fatigue strength and to define the fatigue design criteria to be applied'.
DNV	DNV (1995)	General background is given for the rule requirements for fatigue control of ship structures and detailed recommendations for such control. Various levels of fatigue assessment procedures defined include a simplified approach and a direct calculation approach. Its application is required for structural details 'subjected to extensive dynamic loading'.
GL	GL (1997)	Rules for simplified fatigue strength analysis. Its application is required for structures which are 'predominantly subjected to cyclic loads'.
LR	LR (1996)	Three levels are given. Level 1 is based on a comparison of the structural details with recommendations derived from consolidation of available service experience. Levels 2 and 3 are a simplified and full spectral direct calculation procedures. The procedure is developed for double hull oil tankers and bulk carriers and is under development for container and LNG/LPG ships. Mandatory for new oil tankers and bulk carriers over 190 metres in length. Level 1 and 2 are to be applied and Level 3 at the request of the shipowner or the shipbuilder.
NK	NK (1996)	A simplified approach for ship design which has been verified for longitudinal stiffeners. Research work is under conduction for improving and revising the guidance. The procedure is applicable for longitudinal, transverse and local strength members of oil tankers, bulk carriers and container ships.
RINA	RINA (1995)	Rules for checking of the fatigue strength of ship hull structures by means of a simplified fatigue analysis. Applicable for ship structures which satisfy RINA standards for obtaining the highest class made of normal and/or high strength steels. Its application is required for the special notation FTC by RINA.
KR	KR (1995)	Guidance for simplified fatigue strength assessment of ship structures at the initial stage.

Table 2 (con't) – Summary of Fatigue Design Code Specifics (from Moan 1997)
(A Short Summary of Different Fatigue Assessment Procedures Available for Ship Design)

Class.	Loads			Stress anal. guid.		Fatigue strength[1]				Corrosion	Safety	Program	Guidance on
Soc.	Basis	Prob.	Shape	nominal	SCF	Nom.	Local[2]	mean[3]	thick.[4]	method	factor[5]	name	details
ABS	Rule	$2 \cdot 10^{-8}$	Weib.	simple	yes	DoE	DoE	no[6]	spec. case	net[7]	no	SafeHull	yes
BV	Rule	10^{-5}	Weib.	no	yes	DoE	DoE[8]	yes	25 mm	time[9]	no[10]	VeriStar	no
DNV	Rule/Direct	10^{-4}	Weib.	simple / FE	yes	no	own[11]	yes	22 mm	net[12]	no	Nauticus	yes
GL	Rule	10^{-6}	Lin.	simple	yes	IIW	IIW	yes	spec. case	no[13]	yes[14]	Poseidon	yes (incl. rules)
LR[15]	Simple/spectral approach[16]			simple / FE	yes	no	own[17]	no	22 mm	net[18]	no	ShipRight	yes (in program)
NK	Direct[19]	10^{-4}	Weib.	FE	yes	BS	BS	yes	no	no[20]	yes[21]	PrimeShip	yes
RINA	Rule	10^{-8}	Lin.	simple	no	IIW	IIW	yes	no	no	no	no	yes
KR	Rule	10^{-4}	Weib.	simple	yes	-	DoE	yes	22 mm	true[22]	no	no	no

1 The S-N data sources are given for nominal (Nom.) and local approaches. BS refers to British Standard 5400, IIW to IIW (1996) and DoE to different editions of the ref. "Offshore Installations: Guidance on Design Construction and Certification", Health and Safety Executive (formerly Department of Energy), U.K.
2 Local approach is the hot spot method in most cases. Comparison of different local approach S-N curves is given in Figure 7.1.
3 Mean stress correction is applied on the stress range basing on the mean stress or in case of NK (1996) on S-N curve by modifying the slope.
4 The thickness effect is accounted for by a factor on stress range above the given reference thickness.
5 Mean minus two standard dediations S-N curves are used in most cases. Additional safety factors to this rule are referred here.
6 Not explicitly
7 The stresses calculated for net scantlings are multiplied by a factor of 0.95 to reflect a 'mean wasted condition'.
8 Special local approach is used based on a notch stress which is the structural stress multiplied by a weld factor. For a 45° flank angle the weld factor is 1.96.
9 Corrosion is modeled by multiplying the cumulative damage with a correction factor which is a function of corrosion rate and time.
10 Mean minus one, two or three standard deviation S-N curve for non critical, critical or very particular structural members.
11 Special local approach is used based on a notch stress which is the structural stress multiplied by a weld factor. Default value for the weld factor is 1.5.
12 Stresses are calculated using net scantlings and S-N curves for corrosive environment. A simple approach is given for partially effective corrosion protection.
13 Only implicitly for hold frames in bulk carriers.
14 For non-redundant structures and for rounded corners with large radii.
15 The procedure is available through the use of the ShipRight program.
16 Loads by voyage simulation used in level 2, parametric formulas for ship motions and loads in regular waves. In level 3 direct approach is used.
17 S-N curves are based on parametric formulas of the hot spot SCFs derived from systematic FE-analyses.
18 In level 2 time invariant simulation of thickness reduction due to corrosion is used. In level 3 no corrosion modelling is applied.
19 Two approaches defined are a 'combination' and 'design wave' methods.
20 If considered, in ballast tanks for example, the stresses should be converted to appropriate values and a stress safety factor of 1.1 to 1.3 should be considered.
21 Safety factors are used depending on the importance of the member. Explicite values are not given. For basic joints mean S-N curves are used.
22 True scantlings are applied for stress analysis and S-N curve for corrosive environment. A simple approach is given for partially effective corrosion protection.

Table 3 - Categorization of Fatigue Code Details and S/N Curves

Type of Weld	Code:	ECCS (1985)	BS5400 (1980)	AASHTO (1989)	DNV (1984)	AWS (1976)
Non-welded Details						
Rolled and Extruded products		160	A,B	A	B	A
Sheared or gas cut plates		140,125	B,C	A	C	A
Bolted Connections		140,36	B	B	n/a	n/a
Concrete reinforcing bars		100	n/a	n/a	n/a	n/a
Welded Built-up Sections						
Continuous Longitudinal Welds		125,(112),100	C,(D)	B	B	B
Intermittent Longitudinal Welds		80,71	E	E	E	E
Transverse Butt Welds						
Without Backing Bar		112,(90),80,36	D,(E)	C	C	C
With Backing Bar		71,50	F	n/a	F	n/a
Welded Attachments (non-load carrying welds)						
Longitudinal Attachments		90,80,71,50,45	F,F2	D,E	F,F2	n/a
Transverse Attachments		80,(71)	(F),E	C	F	C
Welded Connections (load carrying welds)						
Cruciform Joints		71,(36)	F,(F2),W	C	F	D
Overlapped Welded Joints		63,45	F2,G	E	F2	n/a
Cover Plates on Beams and Plate Girders		50,36	G	E	G	E
Welds in Shear		80	W,S	F	W	F

Type of Weld	Code:	ECCS	BS5400	AASHTO	DNV	AWS
			(KSI - Stress Range, 2.3% Probability of Failure)			
Welded Built-up Sections						
Continuous Longitudinal Welds		112	D	B	B	B
		9.934	9.667	10.081	11.653	11.098
		3	3	3	4	4.159
Transverse Butt Welds						
Without Backing Bar		90	E	C	C	C
		9.648	9.500	9.653	10.692	10.123
		3	3	3	3.5	3.918
Welded Attachments (non-load carrying welds)						
Transverse Attachments		71	F	D	F	C
		9.342	9.287	9.336	9.286	10.123
		3	3	3	3	3.918
Welded Connections (load carrying welds)						
Cruciform Joints		36	F2	E	F	D
		8.459	9.120	9.031	9.286	9.132
		3	3	3	3	3.399

Table 4 – Candidate Details for Characterization

	BASEPLATE	SURFACE WELDS (ATTACHMENTS)	CONNECTION WELDS (LOAD CARRYING)
TYPICAL (IN-PLANE)	✓ Smooth base material • Ground opening • Drilled holes/penetrations	• Skip welds • Studs/brackets ✓ Longitudinal fillet welds • Longitudinal butt welds ✓ Transverse non-load carrying fillet weld	✓ Transverse butt welds ■ Insert plates - double bevelled ✓ Full penetration load carrying fillet welds ■ Opening details ✓ Transverse bulkhead penetration details ✓ Intercostal - non-continuous stiffeners
INTENTIONAL ECCENTRICITY	• Bolted connections • Formed/bent plate (knuckle)	■ Doubler plates ($t_d = t_p$) ■ Doubler plates ($t_d > t_p$)	■ Insert plates - flush one side ■ Lapped fillet welds • Knuckle - with butt weld ■ Mismatched stiffeners
UNINTENTIONAL ECCENTRICITY	• Damaged/dished plate	• Forced alignment • Welding distortion	✓ Mismatched (offset) plates - full penetration ■ Mismatched (offset) plates - partial penetration • Angular mismatch
SURFACE FLAWS	■ Flame cut unreinforced opening	• Transverse fillet weld with undercut • Weld start/stop points	• Transverse butt weld with undercut • Surface crack-like defect (EDN)
BURIED FLAWS		• Porosity	■ Partial penetration load carrying fillet welds ✓ Partial penetration transverse butt welds • Porosity, inclusions
FLAW IMPROVED FATIGUE BEHAVIOR		• Contour ground fillet weld • Peened weld	✓ Contour ground butt weld • Remove weld crown

NOTES: ✓ **INDICATES THAT FATIGUE TEST DATA FOR THESE SPECIMENS EXISTS**
■ **INDICATES FATIGUE TEST SPECIMENS**
• **INDICATES POTENTIAL FATIGUE SPECIMEN**

Table 5 – Stress Concentration Factors for Test Specimens

Test Specimen Configuration	SCF	B	Log(A) (ksi)		Std Dev
			Ampl.	Range	log(Life)
Flame Cut Edge	n/a	-3.705	10.553	11.668	0.092
HSLA Continuous Cruciform (FP)	2.4 @toe	-3.210	9.559	10.525	0.185
HSLA Discontinuous Cruciform (FP)	2.4 @toe	-3.307	9.601	10.597	0.263
HSLA Discontinuous Cruciform (PP)	2.2@toe 4.0@lop	-2.686	8.272	9.081	0.139
HSLA Misaligned Cruciform (FP)	4.8 @toe	-3.949	9.733	10.922	0.227
HSLA Misaligned Cruciform (PP)	5.6@toe 5.0@lop	-3.349	8.513	9.521	0.208
HSLA Insert Plate (FP)	2.7 @toe	-5.090	12.101	13.633	0.184
HSLA Insert Plate (LOP defect)	n/a	-4.009	9.845	11.051	0.103
HSLA One-Sided Welds	1.3 @butt	-3.298	9.956	10.949	0.307
HSLA Same Thickness Doubler	2.1 @toe	-3.122	9.179	10.119	0.490
HSLA Double Thick Doubler	1.4 @toe	-2.780	8.843	9.680	0.555
HSLA Opening Detail	2.0 @corner	-3.480	8.923	9.971	0.203
HSLA Stiffener Splice	n/a	-4.250	10.843	12.122	0.177
HSLA Bulkhead Penetration	n/a	-3.230	9.427	10.399	0.169

FP – Full Penetration Weld
PP – Partial Penetration Weld
LOP – Lack of Penetration

Table 6 – Conversion Formulas for S/N Curves

Convert	To: →	Single Amplitude		Double Amplitude	
From: ↓		Stress (ksi)	Stress (MPa)	Stress (ksi)	Stress (MPa)
Single Amplitude	Stress (ksi)	No Change	$log(A_{amp})_{MPa} =$ $log(A_{amp})_{ksi}$ $- Blog(6.89)$	$log(A_{rng})_{ksi} =$ $log(A_{amp})_{ksi}$ $- Blog(2)$	$log(A_{rng})_{MPa} =$ $log(A_{amp})_{ksi}$ $- Blog(2)$ $- Blog(6.89)$
	Stress (MPa)	$log(A_{amp})_{ksi} =$ $log(A_{amp})_{MPa}$ $+ Blog(6.89)$	No Change	$log(A_{rng})_{ksi} =$ $log(A_{amp})_{MPa}$ $- Blog(2)$ $+ Blog(6.89)$	$log(A_{rng})_{MPa} =$ $log(A_{amp})_{ksi}$ $- Blog(2)$
Double Amplitude	Stress (ksi)	$log(A_{amp})_{ksi} =$ $log(A_{rng})_{ksi}$ $+ Blog(2)$	$log(A_{amp})_{MPa} =$ $log(A_{rng})_{ksi}$ $+ Blog(2)$ $- Blog(6.89)$	No Change	$log(A_{rng})_{MPa} =$ $log(A_{rng})_{ksi}$ $- Blog(6.89)$
	Stress (MPa)	$log(A_{amp})_{ksi} =$ $log(A_{rng})_{MPa}$ $+ Blog(2)$ $+ Blog(6.89)$	$log(A_{amp})_{MPa} =$ $log(A_{rng})_{MPa}$ $+ Blog(2)$	$log(A_{rng})_{ksi} =$ $log(A_{rng})_{MPa}$ $+ Blog(6.89)$	No Change

Note: S/N curve is of the power law form and "B" does not change during the transformation of log(A).

$$N = 10^{\log(A)} S^{B}$$

Example:

$B = -3$
$\log(A_{amp})_{ksi} = 9.0$
$\log(A_{amp})_{MPa} = 11.515$
$\log(A_{rng})_{ksi} = 9.903$
$\log(A_{rng})_{MPa} = 12.418$

REFERENCES

AASHTO (1989), Standard Specification for Highway Bridges, 14th ed., The American Association of State and Highway Transportation Officials, Washington, D.C.

ABS (1992), American Bureau of Shipping, "Guide for the Fatigue Strength Assessment of Tankers".

ABS (1996a), "Rules for Building and Classing Steel Vessels, Pt.5, Sect.2, A2AA:Guide for Fatigue Strength Assessment of Tankers, and 3AA:dto. For Bulk Carriers", American Bureau of Shipping.

ABS (1996b), "Guide for Dynamic Based Design and Evaluation of Container Carrier Structures, AC: Simplified Method for Fatigue Strength Assessment", American Bureau of Shipping.

ASTM (1988), Procedure E-739, Metals Test Methods and Analytical Procedures, Volume 03.01,"Standard Practice for Statistical Analysis of Linear or Linearized Stress-Life (S-N) and Strain-Life (ε-N) Fatigue Data"

AWS (1976),"Welding Handbook", Seventh Edition, Vol. 5.

Bogdanoff, J.L., and F. Kozin (1985), "Probabilistic Models of Cumulative Damage", John Wiley & Sons.

BS5400 (1980), British Standards Institute, BS5400,"Steel, Concrete, and Composite Bridges, Part 10, Code of Practice for Fatigue".

BV (1994), Bureau Veritas, "Fatigue Strength of Welded Ship Structures", NI 393 DSM R00.

DnV (1984), Det Norske Vertitas,"Fatigue Strength Analysis for Mobile Offshore Units", DnV Classification Notes No. 30.2.

DNV (1995),"Fatigue Assessment of Ship Structures", Tech. Rep. DNVC 93-0432, Det Norske Veritas.

Dexter, R.J., etal (1993),"Development of Advanced Double Hull Concepts, Phase I.3a, Structural Failure Modes: Fatigue", Lehigh University Report TDL 91-01, Volume 3a.

Dexter, R.J., and M. Kaczinski (1994),"Large-Scale Fatigue Tests of Advanced Double Hull Weld Joints", The Advanced (uni-directional) Double-Hull Technical Symposium, Gaithersburg, Maryland.

ECCS (1985), European Convention for Constructional Steelwork,"Recommendations for the Fatigue Design of Steel Structures", ECCS-Technical Committee 6 – Fatigue, 1st edn.

Frost, N.E., K.J. Marsh, and L.P. Pook (1974), "Metal Fatigue", Oxford University Press.

GL (1997),"Rules for Classification and Construction. I – Ship Technology. Part I – Seagoing Ships. Chapter 1 – Hull Structures, Section 20 Fatigue Strength", Germanischer Lloyd.

Kihl, D.P. (1992)," A Comparison of Three Fatigue Assessment Procedures for Surface Ship Structures", NSWCCD report, SSPD-93-173-19.

Kihl, D.P. (1994a),"Axial Fatigue Behavior of Advanced Double Hull Combatant Weld Details", The Advanced (uni-directional) Double-Hull Technical Symposium, Gaithersburg, Maryland.

Kihl, D.P. (1994b),"Mean Stress Effects in Steel Weldments Subjected to Constant and Random Amplitude Fatigue Loadings", NSWCCD report, SSM-65-95/11.

Kihl, D.P., and S. Sarkani (1992),"Stochastic Fatigue Damage Accumulation in High Strength Welded Steel Joints", NSWCCD report SSPD-93-173-13.

Kihl, D.P, and S. Sarkani (1997),"Thickness Effects on the Fatigue Strength of Welded Steel Cruciforms", International Journal of Fatigue, Vol. 19, Supp. No. 1, pp. S311-S316.

KR (1995),"Guidance for the Fatigue Assessment of Ship Structures", Korean Register of Shipping.

Lipson, C., and N.J. Sheth (1973), "Statistical Design and Analysis of Engineering Experiments", McGraw-Hill Inc.

LR (1996),"ShipRight FDA. Fatigue Design Assessment Procedure. Structural Detail Design Guide", Lloyd's Register of Shipping.

Maddox, S.J. (1991),"Fatigue Strength of Welded Structures", 2nd edn., Abington Publishing, Cambridge.

Miles, J.W. (1954),"On Structural Fatigue Under Random Loading", *Journal of Aeronautical Science*, 21, 753-762.

Miner, M.A. (1945),"Cumulative Damage in Fatigue", *Journal of Applied Mechanics*, 12, A159-A164.

Moan, T. and S. Berge (editors) (1997),"Proceedings of the 13th International Ship and Offshore Structures Congress, Volume 1", Elsevier Science.

Munse, W.H., etal (1982), "Fatigue Characterization of Fabricated Ship Details for Design", Ship Structure Committee report #318.

NCHR (1986), "Evaluation of Fatigue Tests and Design Criteria on Welded Details", National Cooperative Highway Research Program Report #286.

Newland, D.E. (1986), "An Introduction to Random Vibrations and Spectral Analysis, 2nd Edition", Longman Inc.

NK (1996) ,"Guidance for Fatigue Design of Ship Structures", Class NK, Primeship-FD, Nippon Kaiji Kyokai.

Palmgren, A. (1924). "Die Lebensdauer von Kugellagern," *Ver. Deut. Ingr., 68, 339-341.*

Press, W.H. , etal (1992),"Numerical Recipes in Fortran, Second Edition", Cambridge University Press, New York, New York.

RINA (1995), "Rules for the Checking of the Fatigue Strength of Ship Hull Structures", Genova, Italy.

Sarkani, S., etal (1992), "Fatigue of Welded Cruciforms Subjected to Narrowband Loadings", *ASCE Journal of Engineering Mechanics*, 118 (2), 296-311. Errata: 119(2), 417, Feb. 1993.

Sarkani, S., etal (1991), "Influence of Small Stress Ranges on Stochastic Fatigue of Welded Joints", *Journal of Structural Engineering*, ASCE, 117(6), 1852-1867.

SSC (1997), Ship Structure Committee, Committee on Marine Structures,"Prevention of Fracture in Ship Structure", Marine Board, National Research Council, Report #PFSS95.

SSC (1998), Ship Structures Committee Report ,"Fatigue-Resistant Detail Design Guide for Ship Structures", prepared by Fleet Technology Limited, September 1998.

Sikora, J.P., etal, (1983),"A Method for Estimating Lifetime Loads and Fatigue Lives for SWATH and Conventional Monohull Ships", *Naval Engineers Journal*, Vol. 95, No.3.

Appendix A

Linear Exceedance Curve Approach

Linear Exceedance Curve Approach

The exceedance curve approach outlined previously is based on a piecewise analysis of the operational profile. Assuming the extrema of each of the response conditions are Rayleigh distributed, the number of cycles exceeding a given response is cumulatively determined over all the response conditions. Repeating these calculations for several other response values results in a set of response values and corresponding number of cycles exceeding each response value which are fit to a Fourier sine series of the following form.

$$\sigma = E_0 - E_1 \log N + E_2 \sin\left(\frac{\pi \log N}{1}\right) + E_3 \sin\left(\frac{\pi \log N}{2}\right) + E_4 \sin\left(\frac{\pi \log N}{4}\right) + E_5 \sin\left(\frac{\pi \log N}{8}\right)$$

In the following analyses, it is assumed that most of the fatigue damage will come from the cyclic stresses represented by the first two terms of the above function. The feasibility of this assumption was considered in Appendix B, Sensitivity of Fatigue Parameters. Considering only the first two terms renders the exceedance curve a linearly decreasing function from the lifetime maximum value.

$$\sigma = E_0 - E_1 \log N_e$$

A closed form expression for fatigue damage accumulation can be obtained by first taking the derivative of the exceedance curve.

$$\frac{d\sigma}{dN_e} = -\frac{E_1 \log e}{N_e}$$

Solving for N_e from the exceedance curve function, noting that the applied cycles, n, is equal to $-dN_e$, and substituting the cycles to failure from the usual form of the constant amplitude S/N curve, allows the damage to be written as a function of the applied stress, σ.

$$D = \frac{n}{N} = \frac{\sigma^{-B} 10^{\left(\frac{E_0 - \sigma}{E_1}\right)}}{AE_1 \log e} d\sigma$$

The cumulative damage can now be determined by integrating the above equation from zero stress to the maximum lifetime stress, σ_{max}.

$$\sum D = \frac{10^{\frac{E_0}{E_1}}}{AE_1 \log e} \int_0^{\sigma_{max}} \sigma^{-B} 10^{\left(\frac{-\sigma}{E_1}\right)} d\sigma$$

The above equation can be solved for integer values of B, the slope of the constant amplitude S/N curve. Although the integral can be evaluated for any integer value of B, only values pertinent to fatigue analyses, i.e., B= -2, -3, and -4 will be provided.

For B= -2:

$$\sum D = \frac{10^{\frac{E_0}{E_1}}}{AE_1 \log e} \left[-\frac{\sigma_{max}^2 E_1 10^{\frac{-\sigma_{max}}{E_1}}}{\ln 10} - \frac{2\sigma_{max} E_1^2 10^{\frac{-\sigma_{max}}{E_1}}}{(\ln 10)^2} - \frac{2E_1^3 \left(10^{\frac{-\sigma_{max}}{E_1}} - 1\right)}{(\ln 10)^3} \right]$$

For B= -3:

$$\sum D = \frac{10^{\frac{E_0}{E_1}}}{AE_1 \log e}\left[-\frac{\sigma_{\max}^3 E_1 10^{\frac{-\sigma_{\max}}{E_1}}}{\ln 10} - \frac{3\sigma_{\max}^2 E_1^2 10^{\frac{-\sigma_{\max}}{E_1}}}{(\ln 10)^2} - \frac{6\sigma_{\max} E_1^3 10^{\frac{-\sigma_{\max}}{E_1}}}{(\ln 10)^3} - \frac{6E_1^4\left(10^{\frac{-\sigma_{\max}}{E_1}} - 1\right)}{(\ln 10)^4}\right]$$

For B= -4:

$$\sum D = \frac{10^{\frac{E_0}{E_1}}}{AE_1 \log e}\left[-\frac{\sigma_{\max}^4 E_1 10^{\frac{-\sigma_{\max}}{E_1}}}{\ln 10} - \frac{4\sigma_{\max}^3 E_1^2 10^{\frac{-\sigma_{\max}}{E_1}}}{(\ln 10)^2} - \frac{12\sigma_{\max}^2 E_1^3 10^{\frac{-\sigma_{\max}}{E_1}}}{(\ln 10)^3} - \frac{24\sigma_{\max} E_1^4 10^{\frac{-\sigma_{\max}}{E_1}}}{(\ln 10)^4} - \frac{24E_1^5\left(10^{\frac{-\sigma_{\max}}{E_1}} - 1\right)}{(\ln 10)^5}\right]$$

Using one of these expressions, the fatigue life can easily be calculated from the equation below.

$$Fatigue\ Life = \frac{Service\ Life}{\sum D}$$

As a numerical example, with A=10^9, E_0=24 ksi and E_1=3 ksi, the following damage summations are calculated for each of the S/N curve slopes.

$$\begin{aligned} B &= -2 \qquad \sum D = 0.3395 \\ B &= -3 \qquad \sum D = 1.3270 \\ B &= -4 \qquad \sum D = 6.9152 \end{aligned}$$

If one now considers the lifetime distribution of stresses to be exponentially distributed, the largest stress expected to be exceeded once in 10^8 cycles can be found from the following equation.

$$P[a > S_{\max}] = 1 - \int_0^{S_{\max}} \frac{1}{\theta} e^{-\frac{a}{\theta}} d\theta = \frac{1}{10^8}$$

From this equation it can be determined that the characteristic life, θ, can be expressed in terms of S_{max} through the following equation.

$$\theta = \frac{S_{\max}}{\ln(10^8)} = \frac{S_{\max}}{18.42068}$$

Now, to determine the number of times (cycles), n_e, a fraction of S_{max}, say αS_{max}, is exceeded, a methodology similar to that used to find S_{max} yields the following equation.

$$n_e = 10^8 e^{\alpha \ln 10^{-8}}$$

If one now solves this equation for several values of α and takes the base ten logarithm of the exceeded cycles, one finds that the results plot as a linear exceedance curve.

Now, consider a constant amplitude S/N curve of the usual power function form with coefficients log(A) and B, and stresses that are assumed to be exponentially distributed, then the expected damage per cycle can be calculated from the following equation.

$$E[D] = \frac{1}{E[N]} = \frac{\int_0^{\infty} \frac{S^{-B}}{\theta} e^{-S/\theta} dS}{A} = \frac{\theta^{-B}\Gamma(1-B)}{A}$$

With the same relationship used before, $\theta = S_{max}/18.42068$, the total damage expected in 10^8 cycles can therefore be determined.

$$\sum D_{total} = \frac{S_{max}^{-B}\Gamma(1-B)}{A(18.42068)^{-B}} 10^8$$

Evaluating this for a few values of "B", the slope of the S/N curve, and S_{max} equal to 24 ksi yields the following.

$$\begin{array}{ll} for \quad B=-2 & \sum D_{total} = 0.3395 \\ for \quad B=-3 & \sum D_{total} = 1.3270 \\ for \quad B=-4 & \sum D_{total} = 6.9156 \end{array}$$

Note that these values are essentially the same as calculated before. In reality, S_{max} can never reach a value of infinity, since it would reach its yield strength first. This is reflected in the upper limit of integration of the last integral and produces an incomplete gamma function. This effect, however, is of little consequence for the range of stresses involved in practical ship design and can be ignored.

It should, however, be noted that the use of exponentially distributed lifetime stresses, whether from an exceedance curve approach or from the closed form given above, may lead to erroneous fatigue damage calculations. Consider the following example. Using the following exceedance curve coefficients which were determined from a lifetime loads analysis of a typical ship and typical operational profile, E0=16.529 ksi, E1=2.066 ksi, E2=0.028 ksi, E3=0.119 ksi, E4=0.178 ksi, and E5=0.853 ksi, with log(A)=9.0 and B=-3, results in fatigue damage of 0.545. Using only the first two coefficients (exponentially distributed lifetime stresses) results in less fatigue damage,

0.436. This means that the exponentially based fatigue life is 25% longer than the fatigue life based on the exceedance curve approach, a non-conservative estimate of fatigue life. Similar examples can be presented which illustrate conservative estimates (in some cases very conservative estimates) of exponentially based fatigue life prediction compared to that obtained from the exceedance curve approach.

Since the results of the exponentially distributed lifetime stress approach do not produce consistently conservative fatigue life estimates, this model should be used with discretion. Confident use, however, may be possible if there is adequate service experience to substantiate its results.

Appendix B

Sensitivity of Fatigue Parameters

Sensitivity of Fatigue Parameters

This appendix illustrates the relative sensitivity of the final fatigue life estimate, in terms of percent change in fatigue life produced by a given percent change in each of the input parameters. This type of analysis provides a way of ranking the importance in variability of each input parameter. Sensitivity of parameters used in both the exceedance curve approach and the Rayleigh Approximation equation are considered separately.

The exceedance curve approach is used for the basis of the first analysis. The exceedance curve is represented by a Fourier sine series with coefficients E0 through E5 defining the tensile stresses and coefficients F0 through F5 defining the compressive stresses. The parameter, SW, represents the stress produced by the still water bending moment.

$$\sigma_{tens} = SW + E_0 - E_1 \log N + E_2 \sin\left(\frac{\pi \log N}{1}\right) + E_3 \sin\left(\frac{\pi \log N}{2}\right) + E_4 \sin\left(\frac{\pi \log N}{4}\right) + E_5 \sin\left(\frac{\pi \log N}{8}\right)$$

$$\sigma_{comp} = -SW - F_0 + F_1 \log N - F_2 \sin\left(\frac{\pi \log N}{1}\right) - F_3 \sin\left(\frac{\pi \log N}{2}\right) - F_4 \sin\left(\frac{\pi \log N}{4}\right) - F_5 \sin\left(\frac{\pi \log N}{8}\right)$$

By separating the exceedance curve into many blocks, the average maximum stress, minimum stress and number of applied cycles contained within each block can be determined. This example also considers mean stress effects, which are accounted for by the Modified Goodman correction using the ultimate tensile stress, S_{ult}.

$$S_{eq} = S_{amp} \Big/ \left(1 - \frac{S_{mean}}{S_{ult}}\right)$$

The other variables include the service life, "Serv Life", which is represented by the exceedance curve stresses, and the scale factor, SF, which is simply used to scale the stress magnitudes to reflect changes in section modulus. The S/N curve is represented by four parameters; log(A) and B, which are the life intercept and slope parameters of the mean S/N curve; and STD and #STD, which are the standard deviation in the log(life) and the number of standard deviations from mean curve that define the probability of failure.

The sensitivity analysis was performed by changing the value of each parameter, in turn, by a given percent and then calculating the corresponding percent change in fatigue life, holding all other parameters at their nominal (zero percent change) value. Although more than one parameter could have been varied at a time, the effect of varying only one parameter was considered.

The results are then plotted on a graph, with the percent change in the parameter on the abscissa and the percent change in the fatigue life on the ordinate axis. Input data for this analysis are located at the top of Table B-1. Results of the exceedance curve parameter sensitivity analysis are located in Table B-2 and shown plotted in Figures B-1 through B-3.

Those parameters that produce a large change in fatigue life are the most important and exhibit larger slopes than the other parameters. The S/N curve coefficients, log(A) and B, the first two coefficients of the stress exceedance curve, E_0, E_1, F_0, F_1, and the scale factor, SF, are found to produce the most change in fatigue life per percent change in the parameter value. Standard deviation, STD, and service life,

Serv. Life, exhibit the next highest change in fatigue life per percent change in parameter value. The remaining parameters exhibit very little change in fatigue life per percent change in the parameter value.

The sensitivity of parameters used in the Rayleigh Approximation formula was considered next. The Rayleigh Approximation formula, given below, uses four parameters to estimate fatigue life in cycles, N; the S/N curve coefficients, log(A) and B, the standard deviation of the S/N curve to produce other than mean (50%) probability of failure, and the RMS stress, σ, which defines the Rayleigh distribution of stresses.

$$N = \frac{10^{\log(A)}}{2^{-B/2}\sigma^{-B}\Gamma\left(1 - B/2\right)}$$

The analysis was performed the same as that described for the exceedance curve approach, with the results plotted in a similar manner. Input parameters for this analysis are also included in Table B-1. Results are provided in Table B-3 and shown plotted in Figure B-4. Results again show the S/N curve coefficients and the RMS stress to be the most sensitive parameters, producing the highest percent change in fatigue life per percent change in parameter value. The S/N curve standard deviation STD was found to produce the lowest percent change in fatigue life per percent change in parameter value.

It should be noted that these results are only intended to indicate the sensitivity of the parameters used in fatigue life estimation. The actual values would change depending on the input values of the parameters, but the general trends shown here are expected to be indicative of most typical cases.

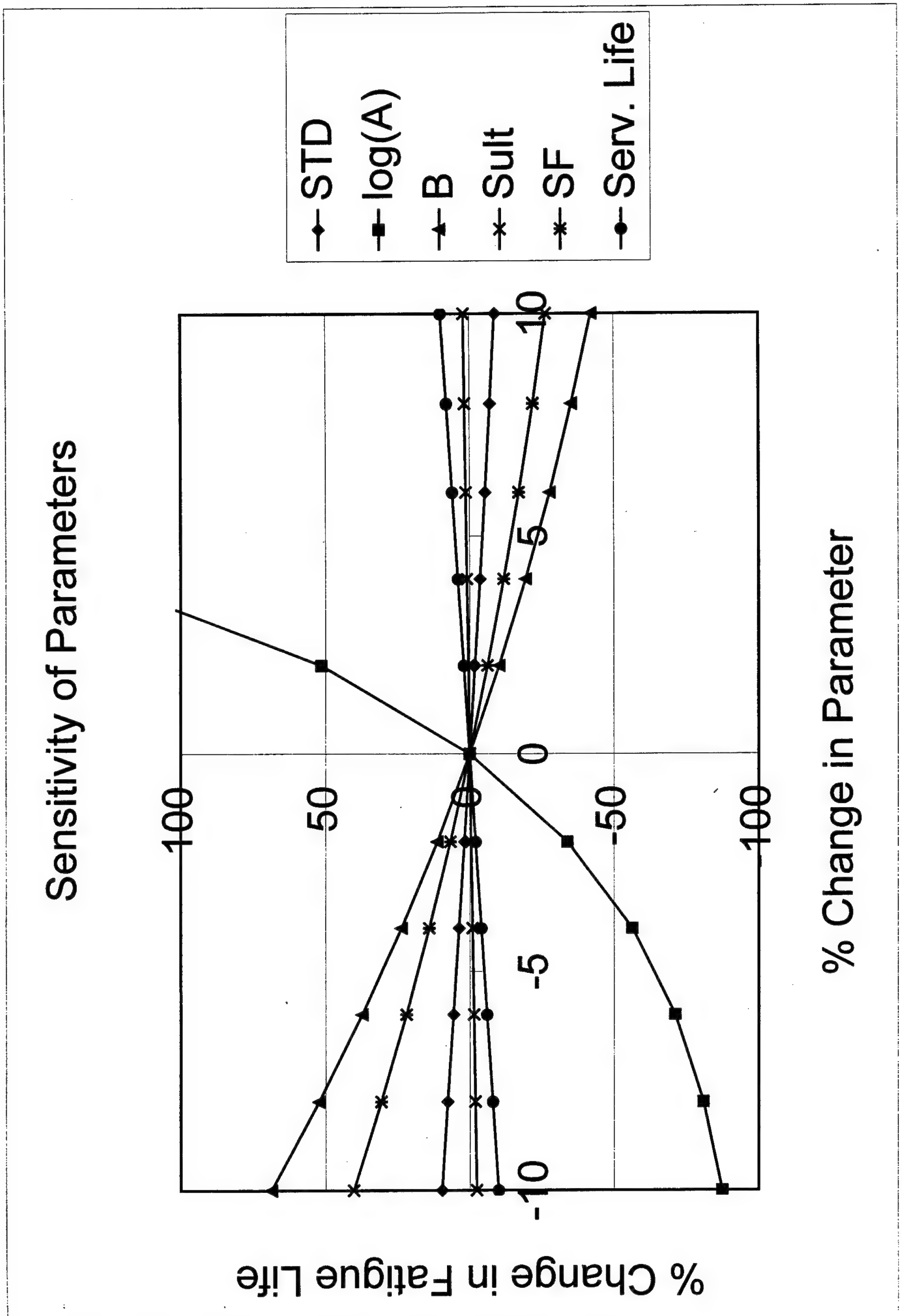


Figure B-1 - Sensitivity of Exceedance Curve Fatigue Parameters (1st set of parameters)

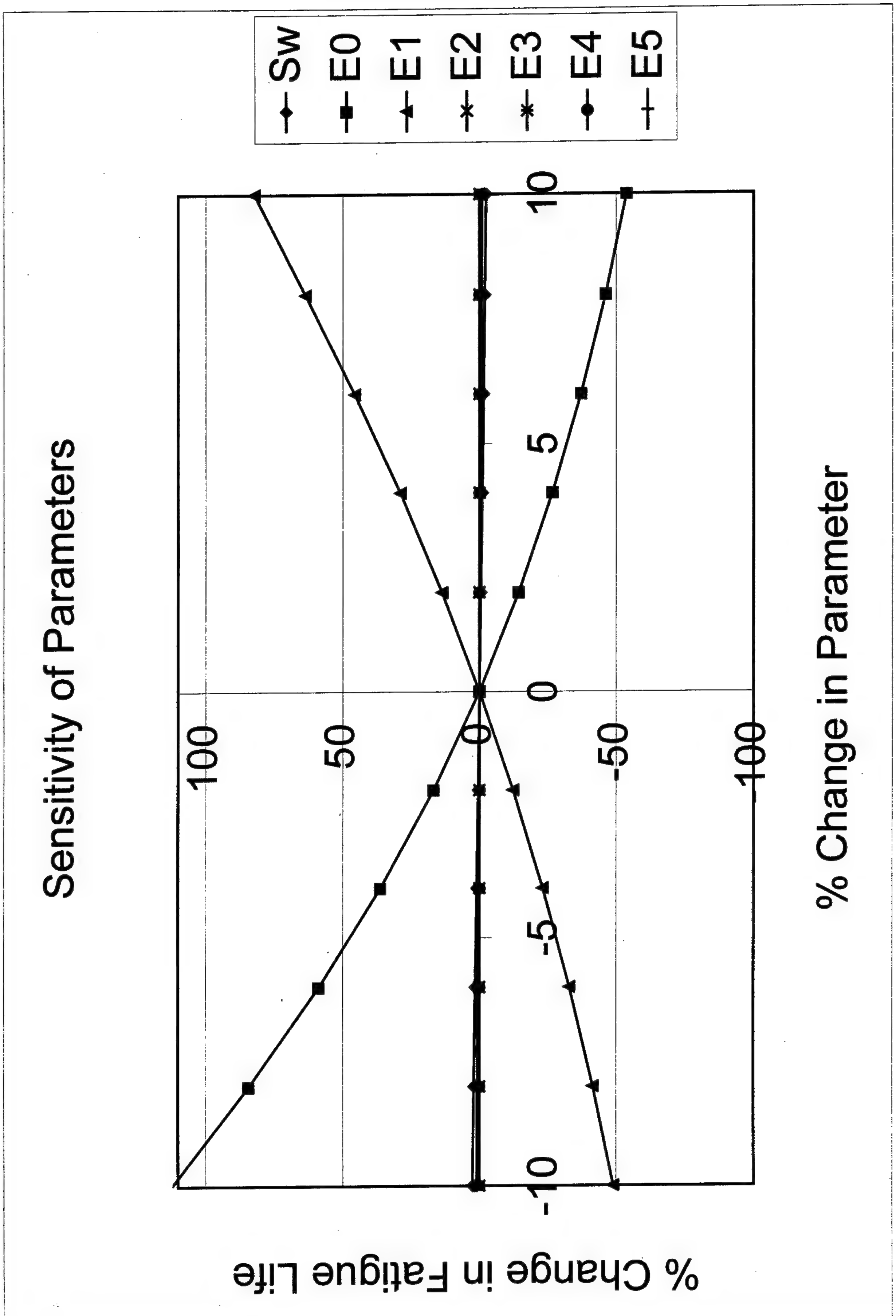


Figure B-2 - Sensitivity of Exceedance Curve Fatigue Parameters (2nd set of parameters)

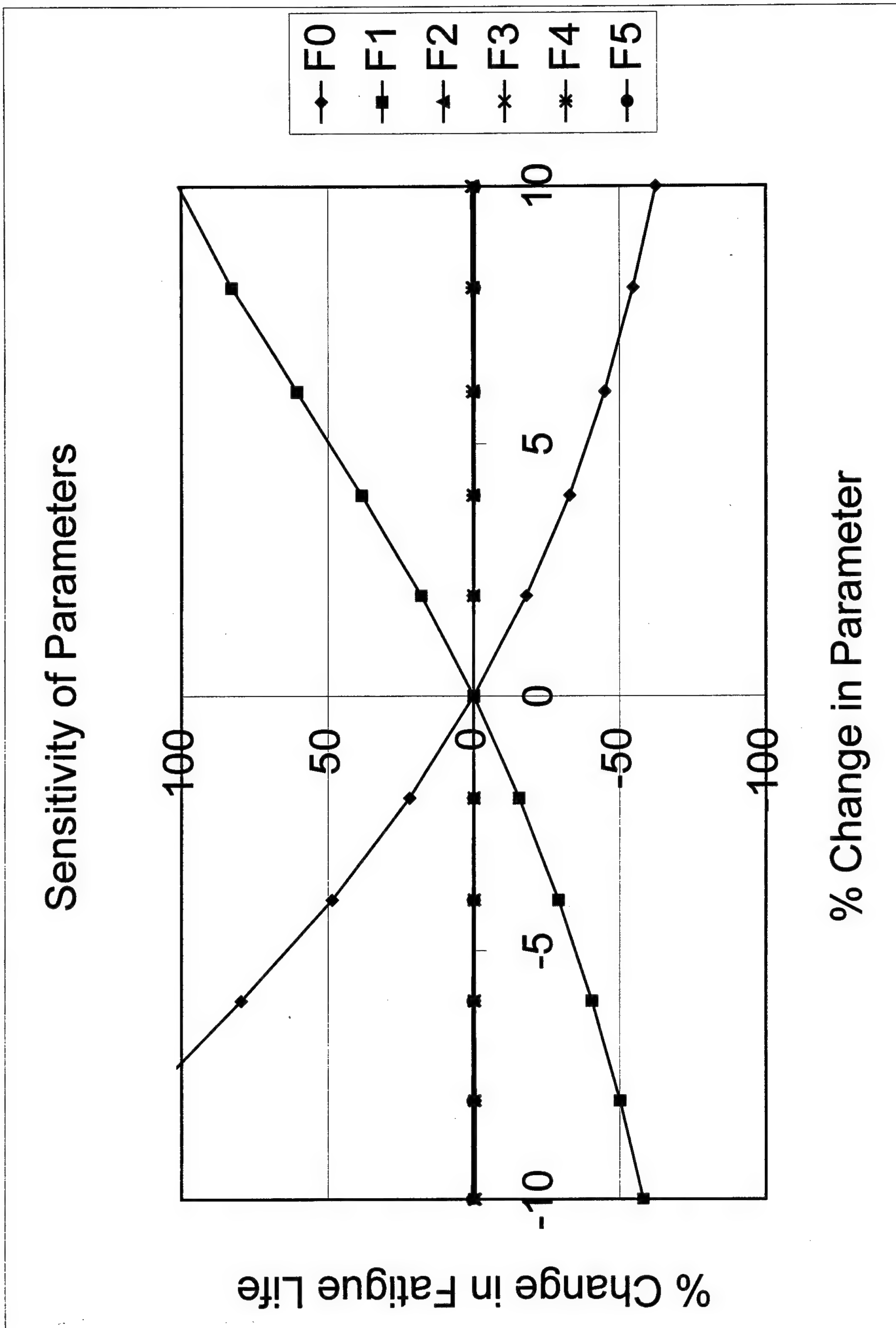


Figure B-3 - Sensitivity of Exceedance Curve Fatigue Parameters (3rd set of parameters)

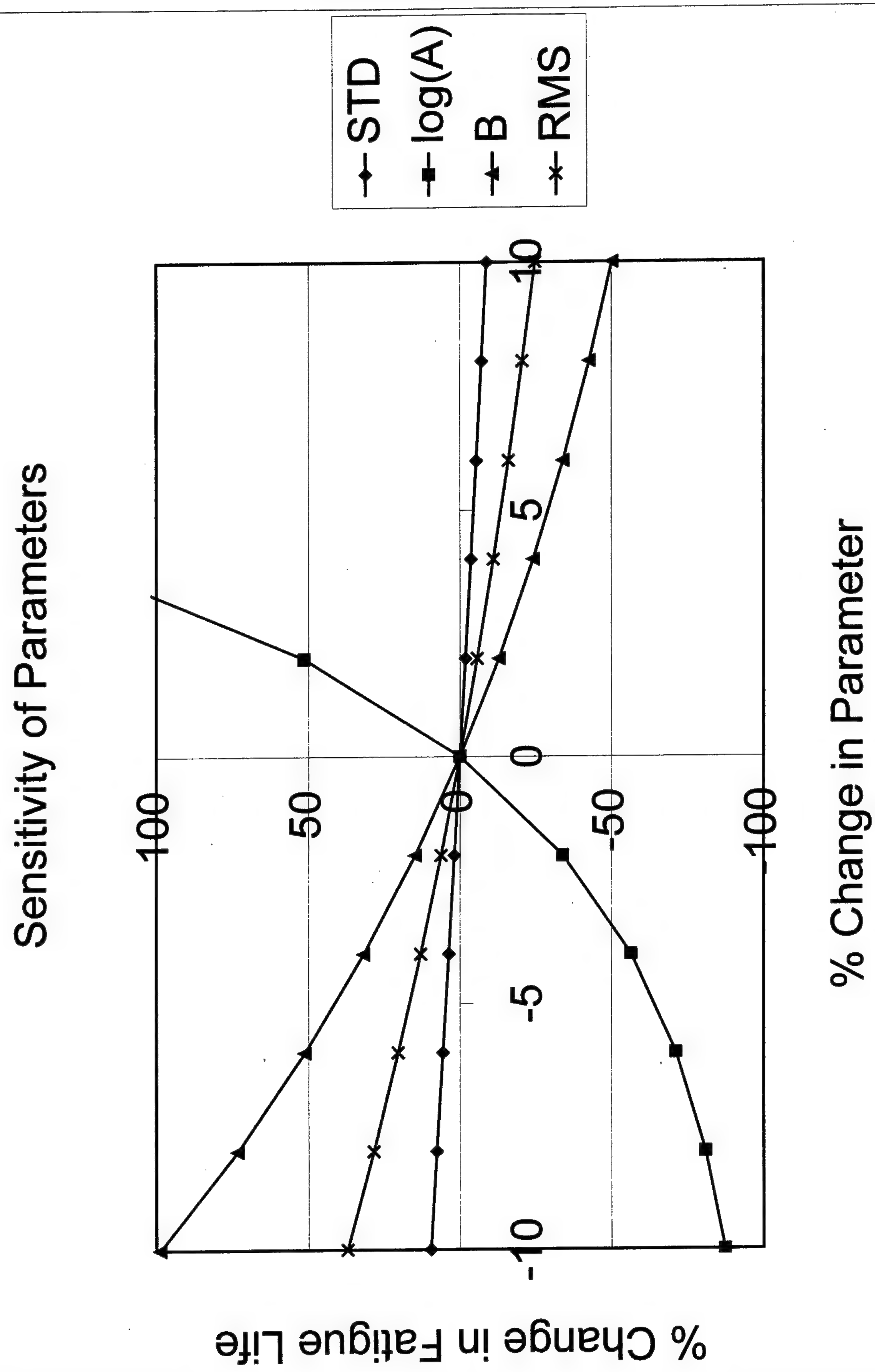


Figure B-4 - Sensitivity of Rayleigh Approximation Fatigue Parameters

Table B-1 - Initial Parameter Values used in Sensitivity Analysis

STD	0.2	RMS	5 ksi
# STD	2	Sult	100 ksi
log(A)	9	Scale Fctr	1
B	-3	Serv Life	30 yrs
SW	7.7893 ksi		
E0	23.2826 ksi	F0	33.0991 ksi
E1	2.9103 ksi	F1	4.1374 ksi
E2	0.0012 ksi	F2	-0.0019 ksi
E3	0.014 ksi	F3	0.1176 ksi
E4	0.0072 ksi	F4	0.2729 ksi
E5	0.6559 ksi	F5	0.3878 ksi

Table B-2 - Sensitivity of Exceedance Curve Fatigue Parameters

%Diff	STD	log(A)	B	Sult	SF	Serv. Life
-10	9.65	-87.41	68.7	-2.46	40.25	-10
-8	7.65	-80.95	52.28	-1.93	30.72	-8
-6	5.68	-71.16	37.3	-1.42	22.01	-6
-4	3.75	-56.35	23.67	-0.93	14.04	-4
-2	1.86	-33.93	11.26	-0.45	6.72	-2
0	0	0	0	0	0	0
2	-1.83	51.36	-10.22	0.44	-6.19	2
4	-3.62	129.09	-19.47	0.86	-11.89	4
6	-5.38	246.74	-27.84	1.27	-17.16	6
8	-7.1	424.81	-35.41	1.66	-22.02	8
10	-8.8	694.33	-42.23	2.04	-26.53	10

%Diff	Sw	E0	E1	E2	E3	E4	E5
-10	2.53	112.26	-48.98	0	-0.02	-0.02	1.04
-8	2.02	84.39	-41.48	0	-0.02	-0.01	0.83
-6	1.51	58.87	-32.92	0	-0.01	-0.01	0.62
-4	1.01	36.31	-23.2	0	-0.01	-0.01	0.42
-2	0.5	16.77	-12.26	0	0	0	0.21
0	0	0	0	0	0	0	0
2	-0.5	-14.4	13.67	0	0	0	-0.21
4	-1	-26.73	28.88	0	0.01	0.01	-0.41
6	-1.5	-37.27	45.6	0	0.01	0.01	-0.62
8	-1.99	-46.24	63.59	0	0.02	0.01	-0.82
10	-2.49	-53.85	82.26	0	0.02	0.02	-1.03

%Diff	F0	F1	F2	F3	F4	F5
-10	141.38	-58.17	0	-0.2	-0.58	0.54
-8	112.9	-50.16	0	-0.16	-0.46	0.43
-6	79.74	-40.53	0	-0.12	-0.35	0.32
-4	48.66	-29.07	0	-0.08	-0.23	0.22
-2	22.02	-15.61	0	-0.04	-0.12	0.11
0	0	0	0	0	0	0
2	-18.1	17.93	0	0.04	0.12	-0.11
4	-32.92	38.33	0	0.08	0.23	-0.21
6	-44.96	60.62	0	0.12	0.35	-0.32
8	-54.68	82.86	0	0.16	0.46	-0.43
10	-62.5	100.89	0	0.2	0.58	-0.54

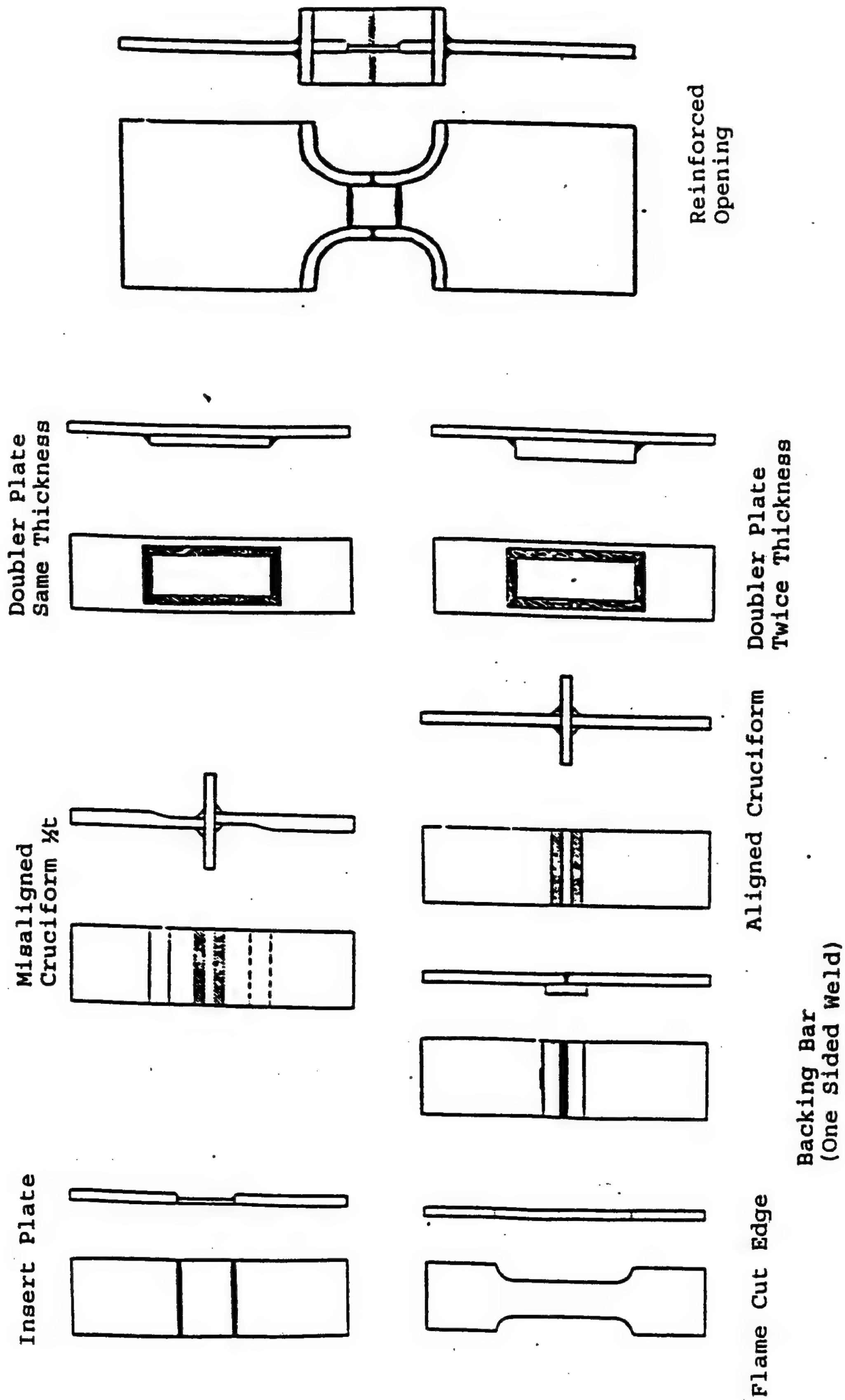
Table B-3 - Sensitivity of Rayleigh Approximation Fatigue Parameters

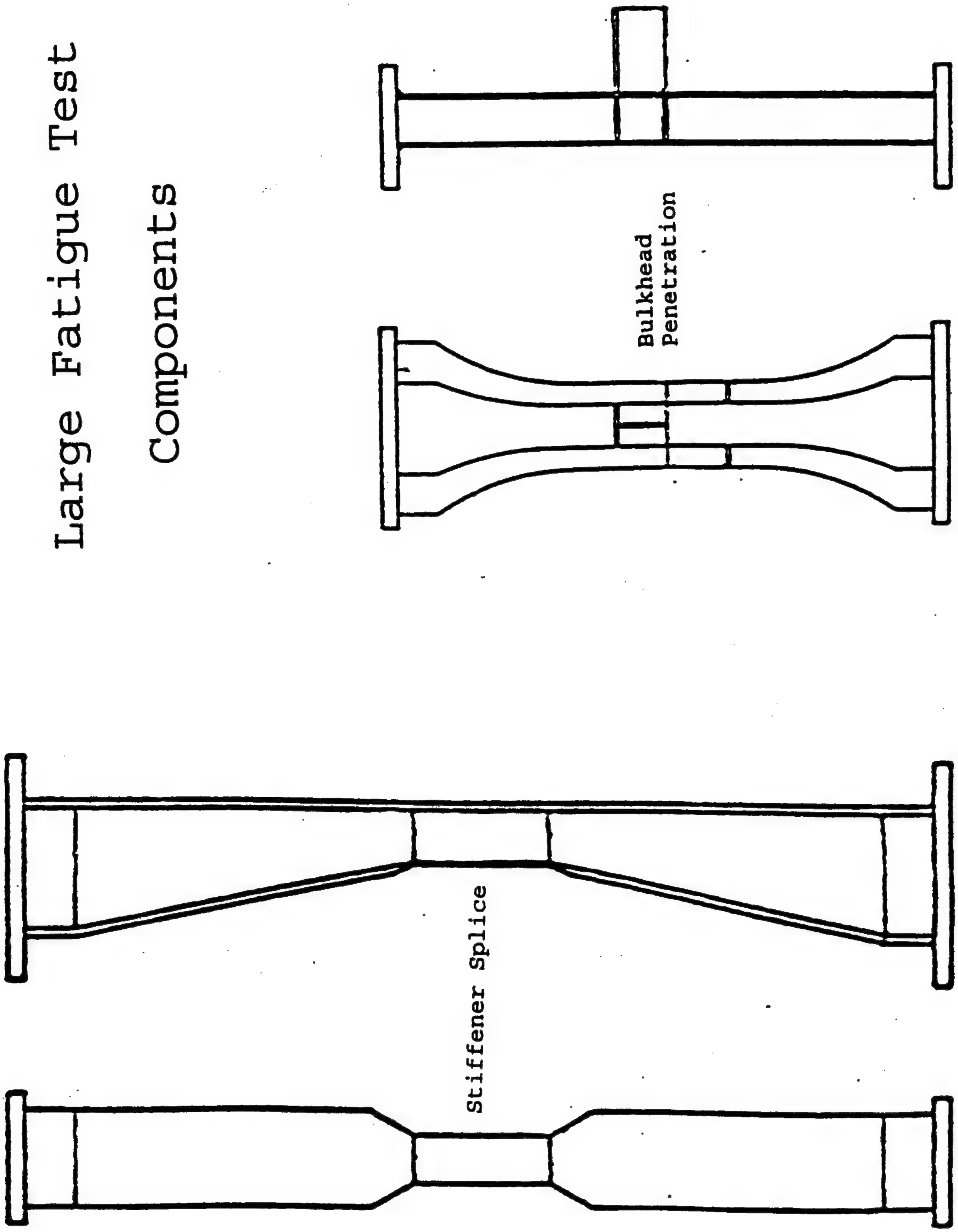
%Diff	STD	log(A)	B	RMS
-10	9.65	-87.41	98.7	37.17
-8	7.65	-80.95	73.36	28.42
-6	5.68	-71.16	51.19	20.4
-4	3.75	-56.35	31.79	13.03
-2	1.86	-33.93	14.82	6.25
0	0	0	0	0
2	-1.83	51.36	-12.95	-5.77
4	-3.62	129.09	-24.25	-11.1
6	-5.38	246.74	-34.12	-16.04
8	-7.1	424.81	-42.72	-20.62
10	-8.8	694.33	-50.23	-24.87

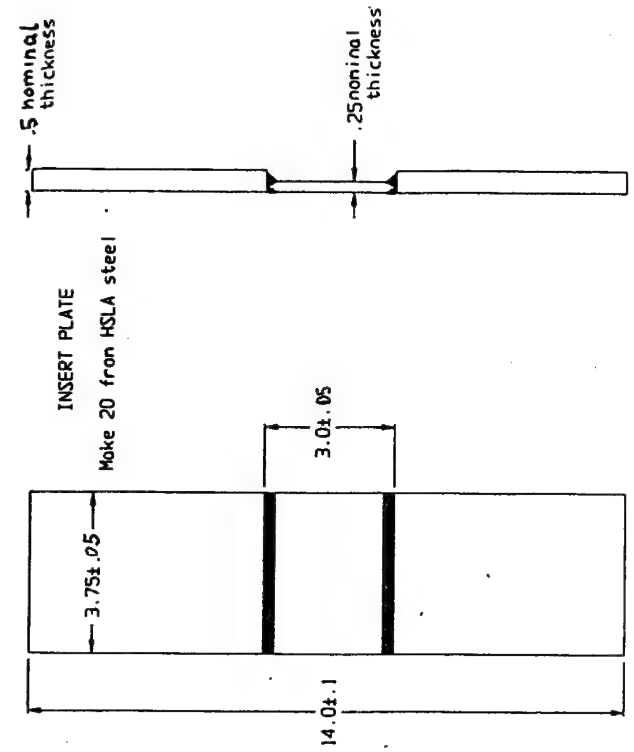
Appendix C

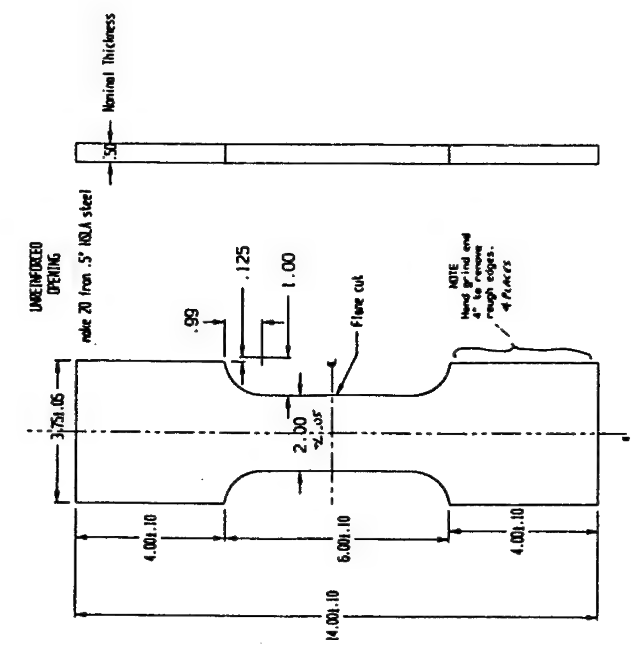
Detailed Geometry of Test Specimens and Components

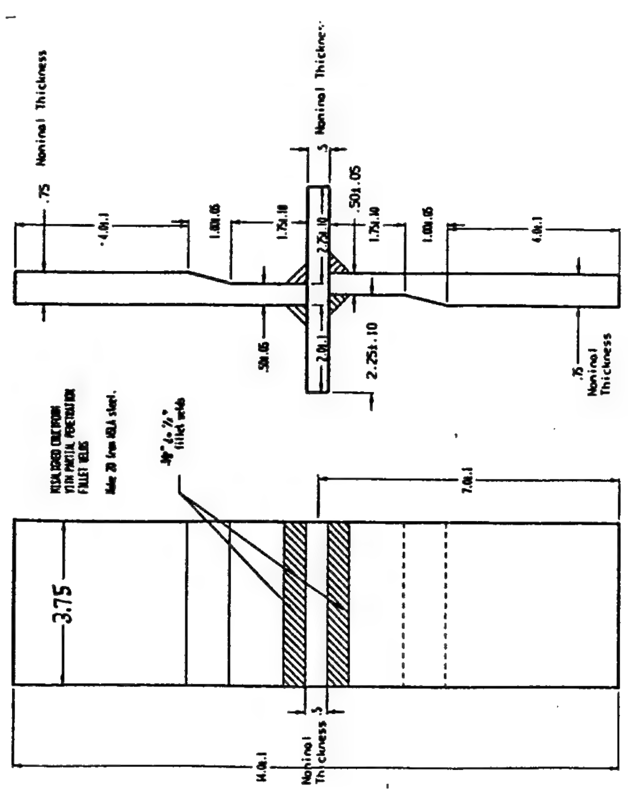
Small Fatigue Test Specimens

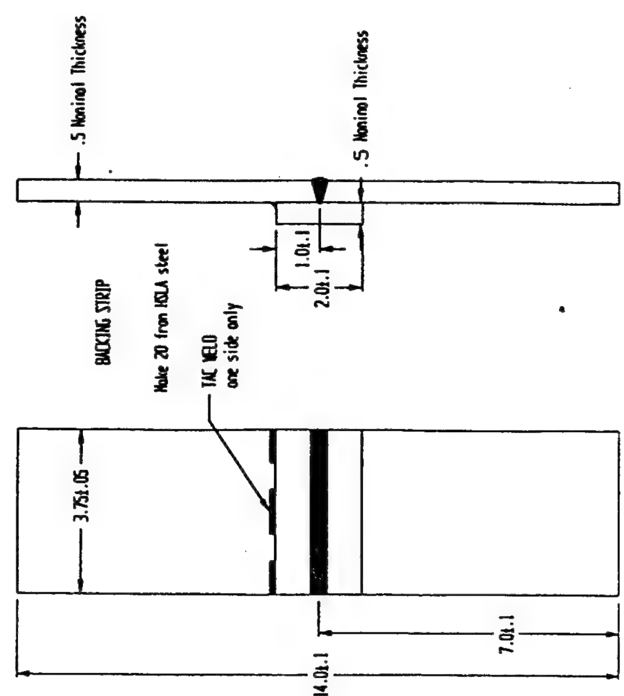


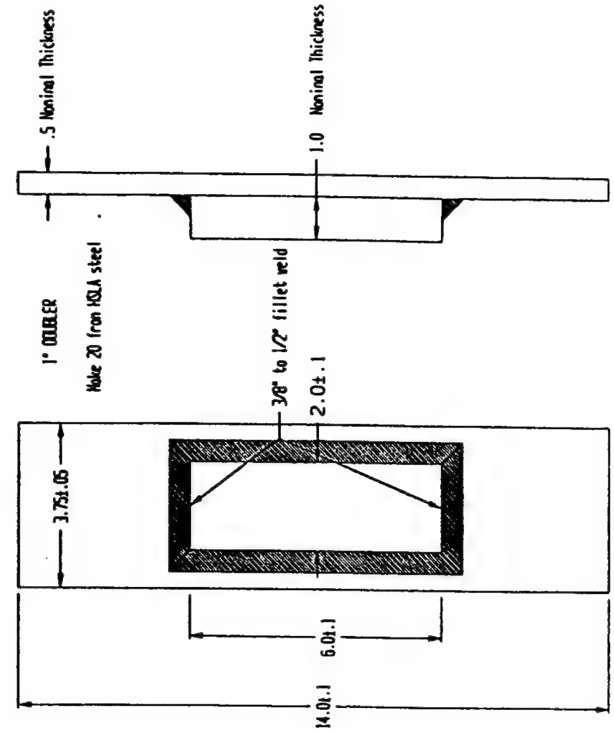

Large Fatigue Test
Components
Bulkhead
Penetration
Stiffener Splice

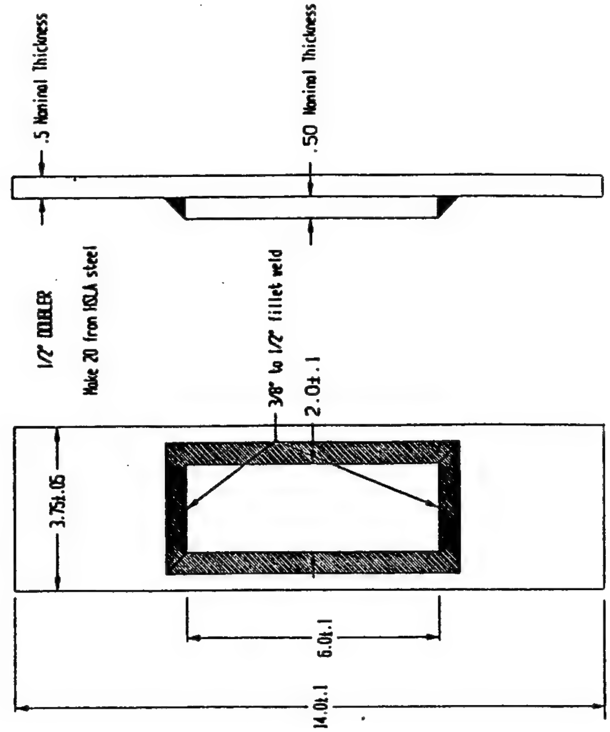

.5 nominal thickness
.25 nominal thickness
INSERT PLATE
Make 20 from HSLA steel
3.0±.05
3.75±.05
14.0±.1

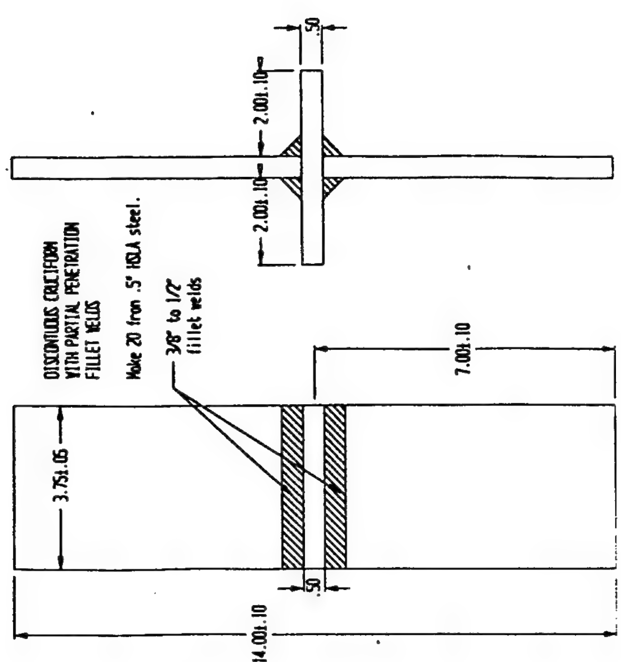

.50
Nominal Thickness
UNREINFORCED OPENING
Make 20 from .5" HSLA steel
.99
.125
1.00
Flame cut
NOTE
Hand grind end
4" to remove
rough edges.
4 places
3.75±.05
2.00
4.00±.10
6.00±.10
4.00±.10
14.00±.10

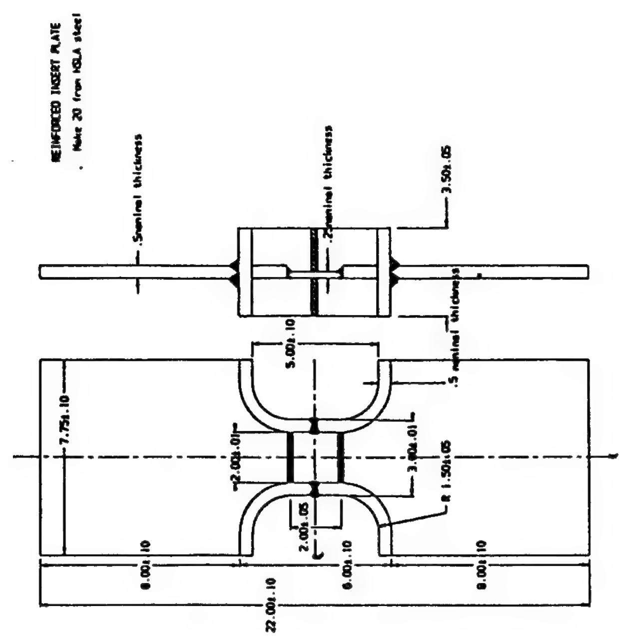

.75 Nominal Thickness
.5 Nominal Thickness
4.0±.1
1.75±.10
.50±.05
2.25±.10
.75 Nominal Thickness
Make 20 from HSLA steel
3.75
7.0±.1
14.0±.1
Nominal Thickness .5


.5 Nominal Thickness
.5 Nominal Thickness
1.0±.1
2.0±.1
BACKING STRIP
Make 20 from HSLA steel
TAC WELD
one side only
3.75±.05
7.0±.1
14.0±.1

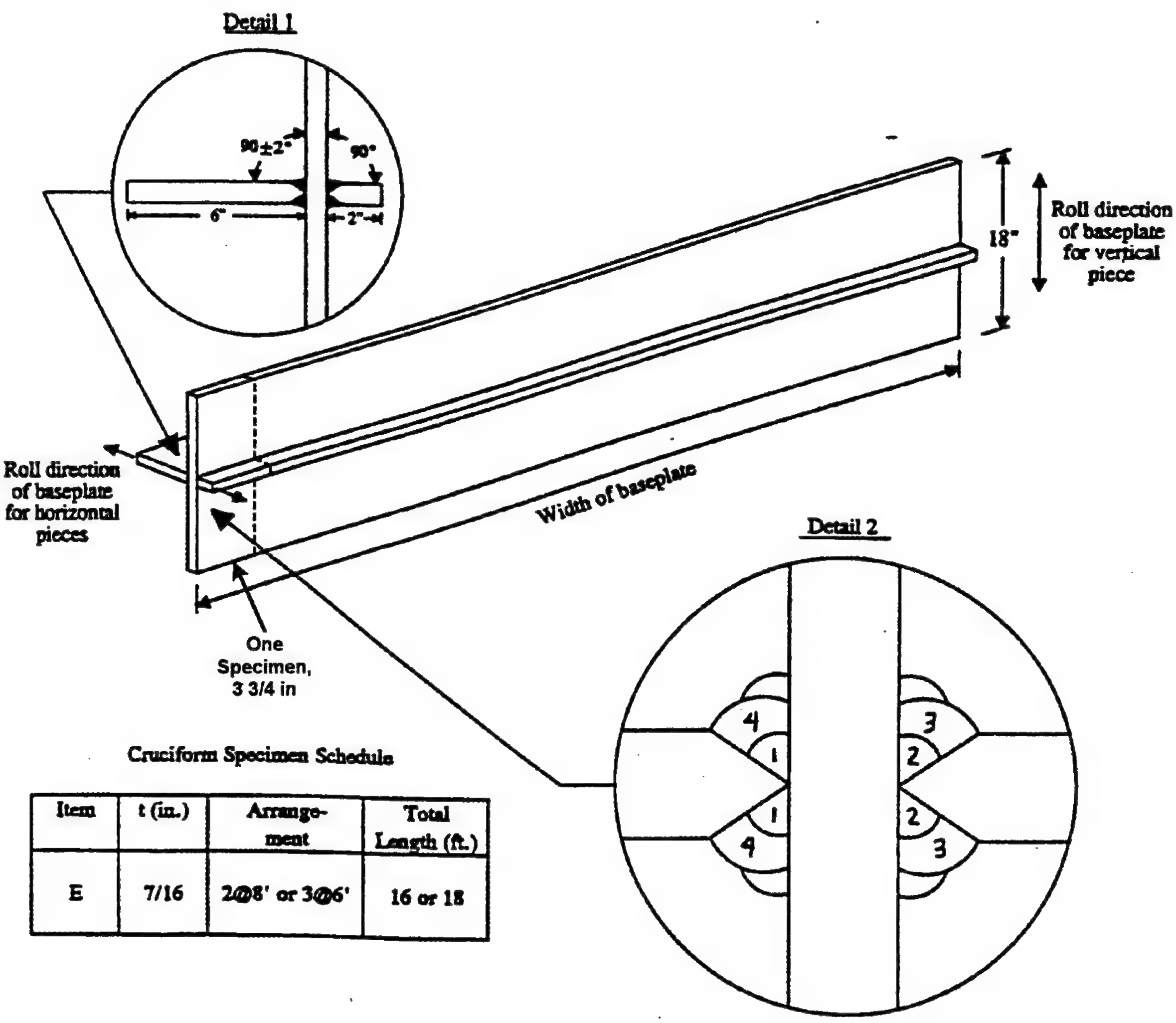

1" DOUBLER
Make 20 from HSLA steel
.5 Nominal Thickness
1.0 Nominal Thickness
3/8" to 1/2" fillet weld
2.0±.1
3.75±.05
6.0±.1
14.0±.1


1/2" DOUBLER
Make 20 from HSLA steel
.5 Nominal Thickness
.50 Nominal Thickness
3/8" to 1/2" fillet weld
2.0±.1
3.75±.05
6.0±.1
14.0±.1


DISCONTINUOUS CRUCIFORM
WITH PARTIAL PENETRATION
FILLET WELDS
Make 20 from .5" HSLA steel.
3/8" to 1/2"
fillet welds
.50
2.00±.10
3.75±.05
7.00±.10
14.00±.10


REINFORCED INSERT PLATE
Make 20 from HSLA steel

Cruciform Test Specimens
HSLA-80
(BENDING)

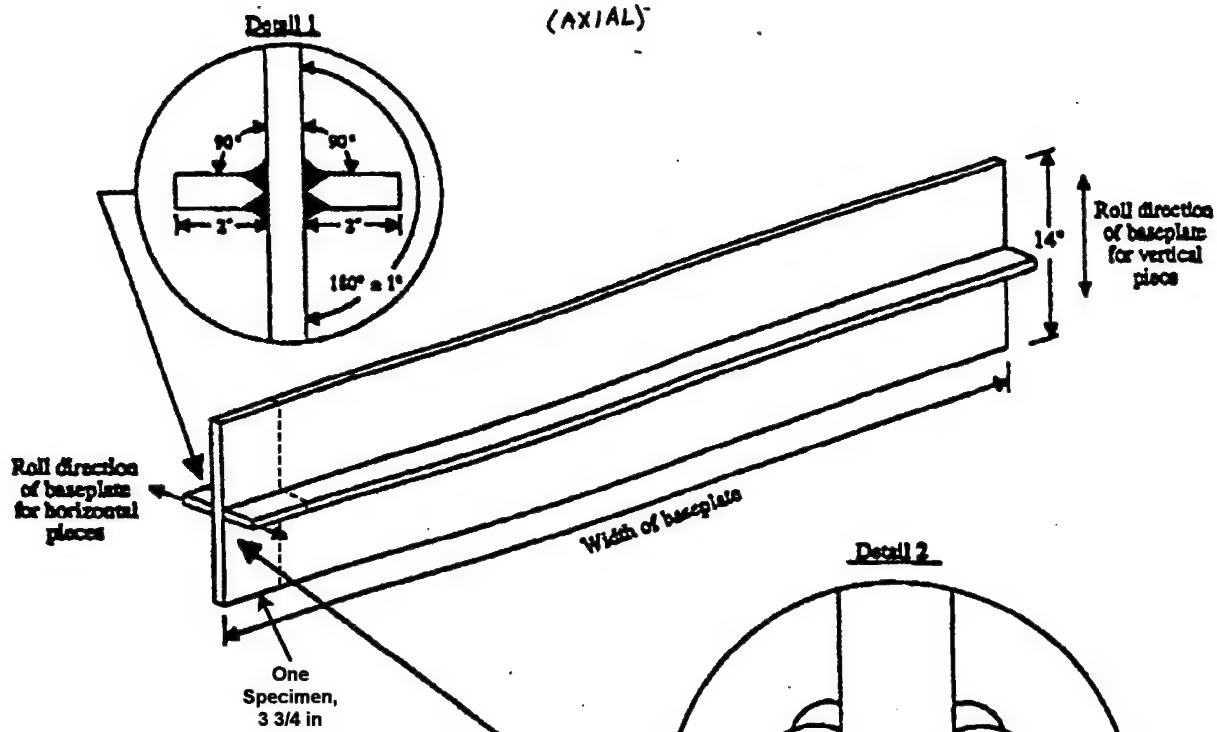


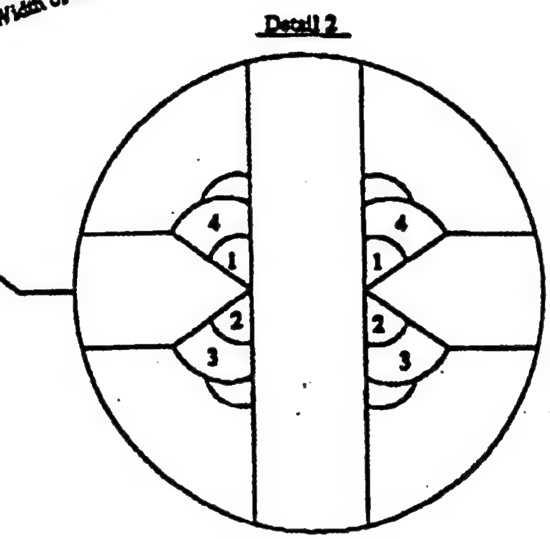
Cruciform Specimen Schedule

Item	t (in.)	Arrange-ment	Total Length (ft.)
E	7/16	2@8' or 3@6'	16 or 18

Notes:
1. Twin arc welding is to be sequenced to balance disortion.
2. Initial welding passes (#1) are to be back ground or back gouged, depending on baseplate thickness, before depostion of additional passes.
3. Total number of passes is to be based on baseplate thickness, wire diameter, and welding parameters.

Cruciform Test Specimens
HSLA-80
(AXIAL)

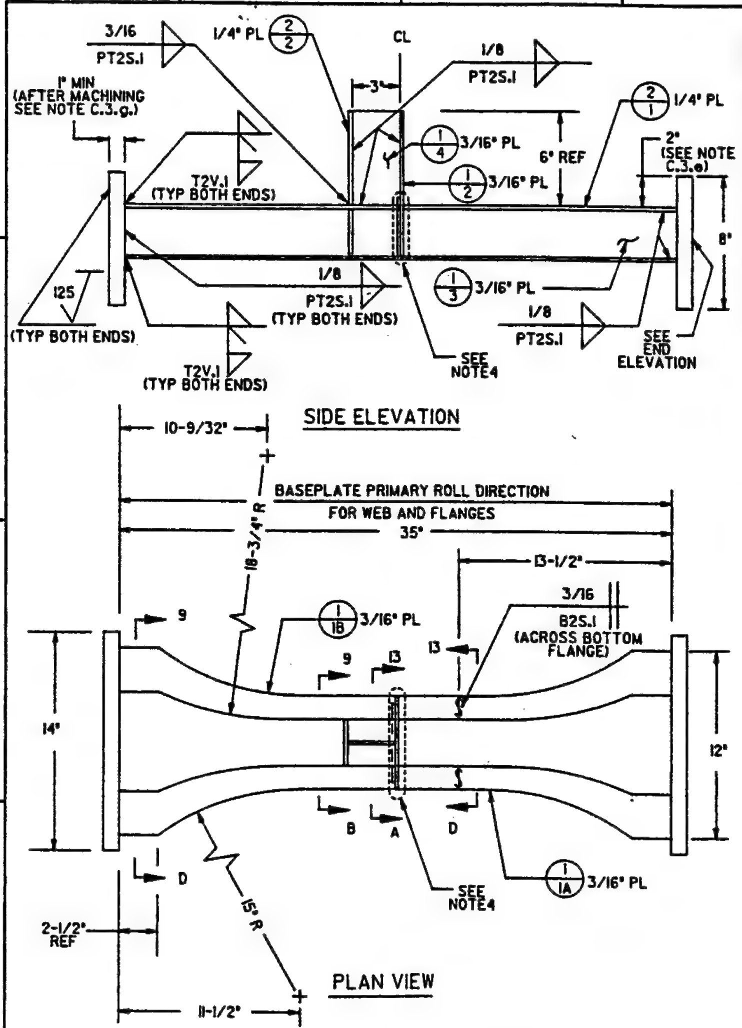




Cruciform Specimen Schedule

Item	t (in.)	Arrange-ment	Total Length (ft.)
A	1/4	2@8' or 3@6'	16 or 18
B	7/16	2@8' or 3@6'	16 or 18
C	3/4	2@8'	16
D	1	2@8'	16

Notes:
1. Twin arc welding is to be sequenced to control distortion.
2. Initial welding passes (#1) are to be back ground or back gouged, depending on baseplate thickness, before deposition of additional passes.
3. Total number of passes is to be based on baseplate thickness, wire diameter, and welding parameters.
4. The weld bead sequences, as shown, are intended to be illustrative only and are not intended to be specific guidance either in position, sequence, or relative size.



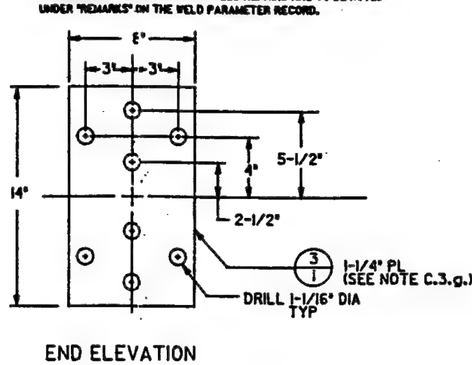
PC. NO.	DESCRIPTION	QTY.	MAT'L.	MAT'L. SPEC.	REMARKS
1-1A	3/16" PL FLG	1	HSLA-80	MIL-S-24645A	VARIABLE WIDTH 6" to 12"x13-1/2"L
1-1B	3/16" PL FLG	1			VARIABLE WIDTH 6" to 12"x21-1/2"L
1-2	3/16" PL FLG	1			CUT FROM 6"x9-1/4"
1-3	3/16" PL WEB	1			3"x35"L
1-4	3/16" PL WEB	1			3"x6"L
1-5	3/16" PL COLLAR	2			ABT 2-1/4"x3-3/4"
2-1	1/4" PL FLG	1			VARIABLE WIDTH 3" to 6-3/8"x35"L
2-2	1/4" PL FLG	1			3"x6"L
2-3	1/4" PL CHOCK	2			ABT 1-1/2"x2-1/2"
3-1	1-1/4" PL END PLATE	2			8"x14"L (SEE NOTE B.1.)

LIST OF MATERIAL

4. THE CONTRACTOR IS TO DETAIL JOINTS WHERE SPECIFIC WELD CALL-OUTS ARE NOT DETAILED IN KEEPING WITH THE INTENT OF REPRESENTING TYPICAL SHIPYARD PRACTICE FOR WELD DETAILING AND FABRICATION.

5. THE CONTRACTOR IS TO TAKE NECESSARY PRECAUTIONS DURING SET UP, FABRICATION, AND MACHINING TO HAVE THE END PLATES PERPENDICULAR TO THE AXIS OF THE SPECIMEN. AFTER MACHINING THE END PLATES ARE TO BE PARALLEL WITH ONE ANOTHER WITHIN 1/6 DEGREE. HOLES DRILLED IN END PLATES ARE TO BE LOCATED WITHIN ±1/64 IN. OF THE STATED DIMENSION RELATIVE TO THE CENTER OF THE END PLATES.

6. ONE SET OF INSPECTION CHECK MEASUREMENTS OF OVERALL DIMENSIONAL PARAMETERS IS TO BE PROVIDED FOR EACH TEST SPECIMEN AFTER FABRICATION HAS BEEN COMPLETED, ALONG WITH THE RESULTS OF VT INSPECTION OF THE WELDS. ANY WELD REPAIRS ARE TO BE NOTED UNDER "REMARKS" ON THE WELD PARAMETER RECORD.



REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPVD.

GENERAL NOTES

A. OVERALL
1. SEE CASDE SOW OF 11/28/94 FOR ADDITIONAL INFORMATION AND SPECIFIC GUIDANCE ON MATERIAL REQUIREMENTS, TRACEABILITY, AND DOCUMENTATION.

B. MATERIAL
1. BASEPLATE MATERIAL IS HSLA-80 STEEL, MIL-S-24645A (END PLATES MAY BE HSS, MIL-S-22698C).
2. ALL MATERIAL IS TO BE TRACEABLE FROM ORIGINAL MILL PRODUCT FORM THROUGH TO EACH INDIVIDUAL TEST SPECIMEN. COPIES OF MILL CERTIFICATIONS, INCLUDING THOSE FOR WELD CONSUMABLES, ARE TO BE PROVIDED. IN A SIMILAR FASHION, PRODUCTION WELDING DATA IS TO BE PROVIDED AS PART OF MATERIAL TRACEABILITY.

C. FABRICATION, WELDING, AND INSPECTION
1. FABRICATION, WELDING, AND INSPECTION OF TEST SPECIMENS ARE TO BE ACCOMPLISHED IN ACCORDANCE WITH THE REQUIREMENTS OF MIL-STD-1689(SH), AND CONSISTENT WITH NORMAL SHIPYARD PRACTICE FOR THE CONSTRUCTION OF U.S. NAVY SURFACE SHIP COMBATANTS. TWIN ARC WELDING IS ACCEPTABLE, SEE SOW. APPROPRIATE FIXTURING/ RESTRAINT, ALONG WITH TACK WELDS, MAY BE USED DURING FITUP AND FABRICATION TO MAINTAIN POSITIONING, ALIGNMENT, AND STRAIGHTNESS OF PIECES/ASSEMBLIES. WELD INSPECTION WILL BE 100% VISUAL (VT) ONLY. WELDING PROCEDURES AND PERSONNEL ARE TO MEET THE REQUIREMENTS OF MIL-STD-248, AND WELD JOINT CONFIGURATIONS ARE TO BE IN ACCORDANCE WITH MIL-STD-22D.

2. WELD WIRES/ELECTRODES ARE TO BE MIL-100S-1 (MIL-E-23765/2D) AND MIL-9018 (MIL-E-22200/10). WELD JOINTS ARE TO BE MADE WITH MIL-100S-1. MIL-9018 MAY BE USED FOR REPAIR, TACK WELDS, ATTACHMENT OF END PLATES AND SECONDARY DETAILS.

3. FABRICATION TOLERANCES ON OVERALL DIMENSIONAL PARAMETERS FOR TEST SPECIMENS ARE:

a. Web height, ±1/8 in.
b. Flange width, ±1/8 in.
c. Flange unbalance (relative to web), ±1/8 in.
d. Flange tilt (relative to web), ±2 degrees
e. Each end plate is to be positioned (not centered) on the end of the beam within ±1/16 in.
f. Length of beam between end plates, +1/8, -1/4 in
g. When welding is completed, the distance from outside edge of one end plate to the counterpart outside edge of the opposite end plate is to be measured at four places. Each place is to be approximately at the mid-location of each of the respe[illegible] four edges. Each of the four individual m[illegible] to be within ±1/16 in. o[illegible] the four measurem[illegible] is to have the [illegible] parallel to one another and per[illegible] to the axis of the specimen, i.e. a fabrication [illegible] prior to skim cutting both end plates to achieve parallelism within normal machining tolerances).

INITIAL DRAWING ISSUE
11-28-94

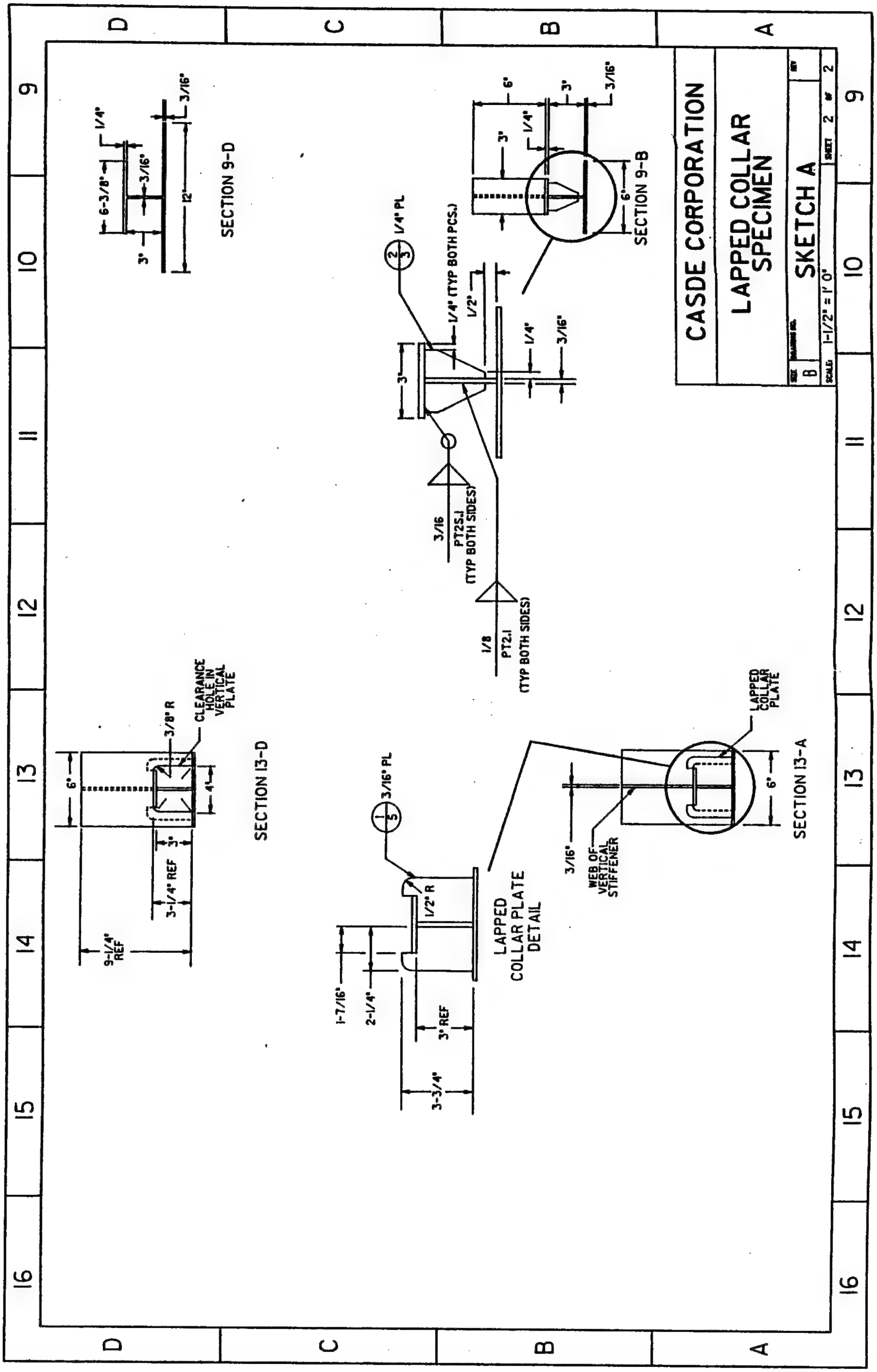
CASDE CORPORATION

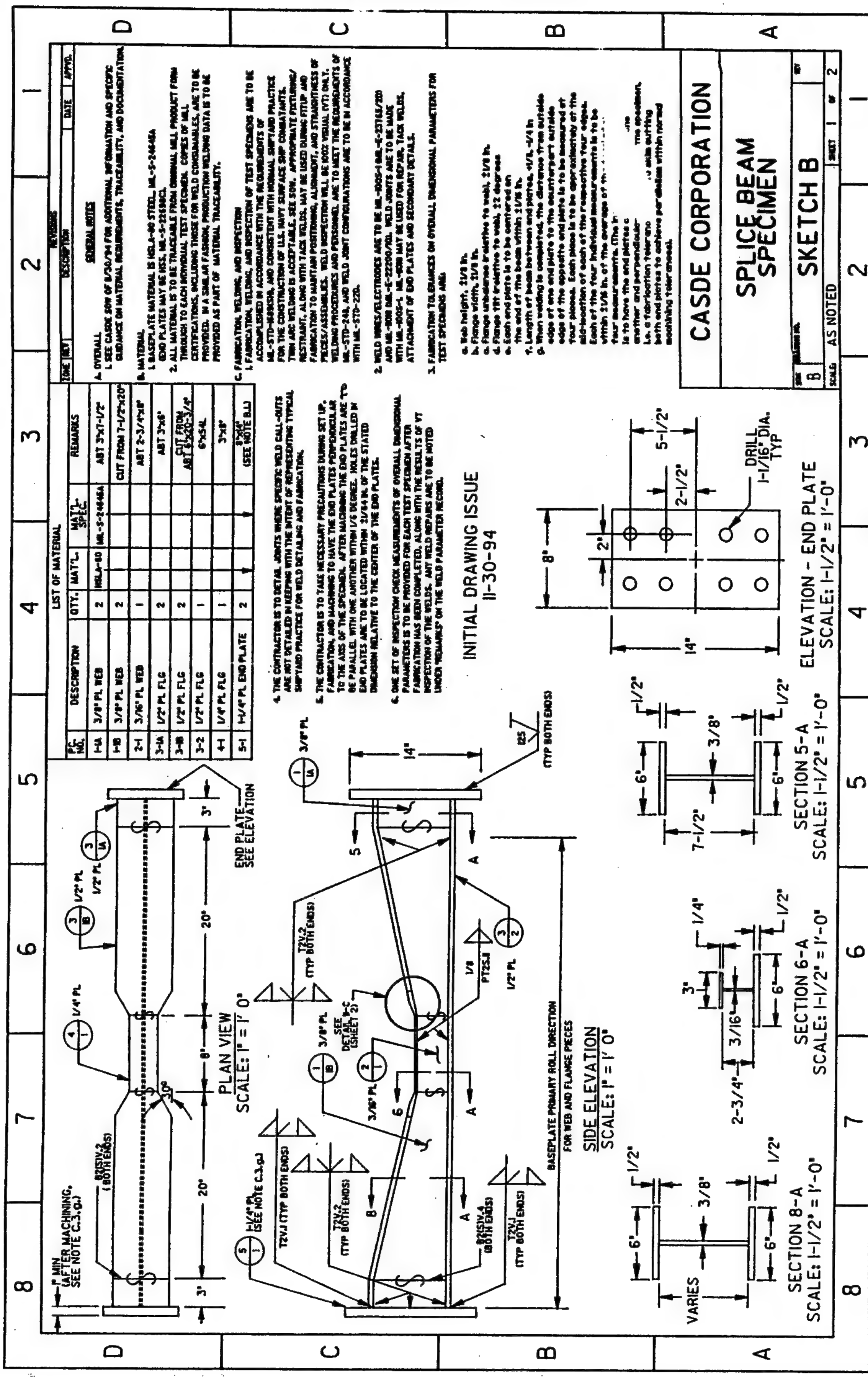
LAPPED COLLAR
SPECIMEN

SIZE B | DRAWING NO. SKETCH A | REV

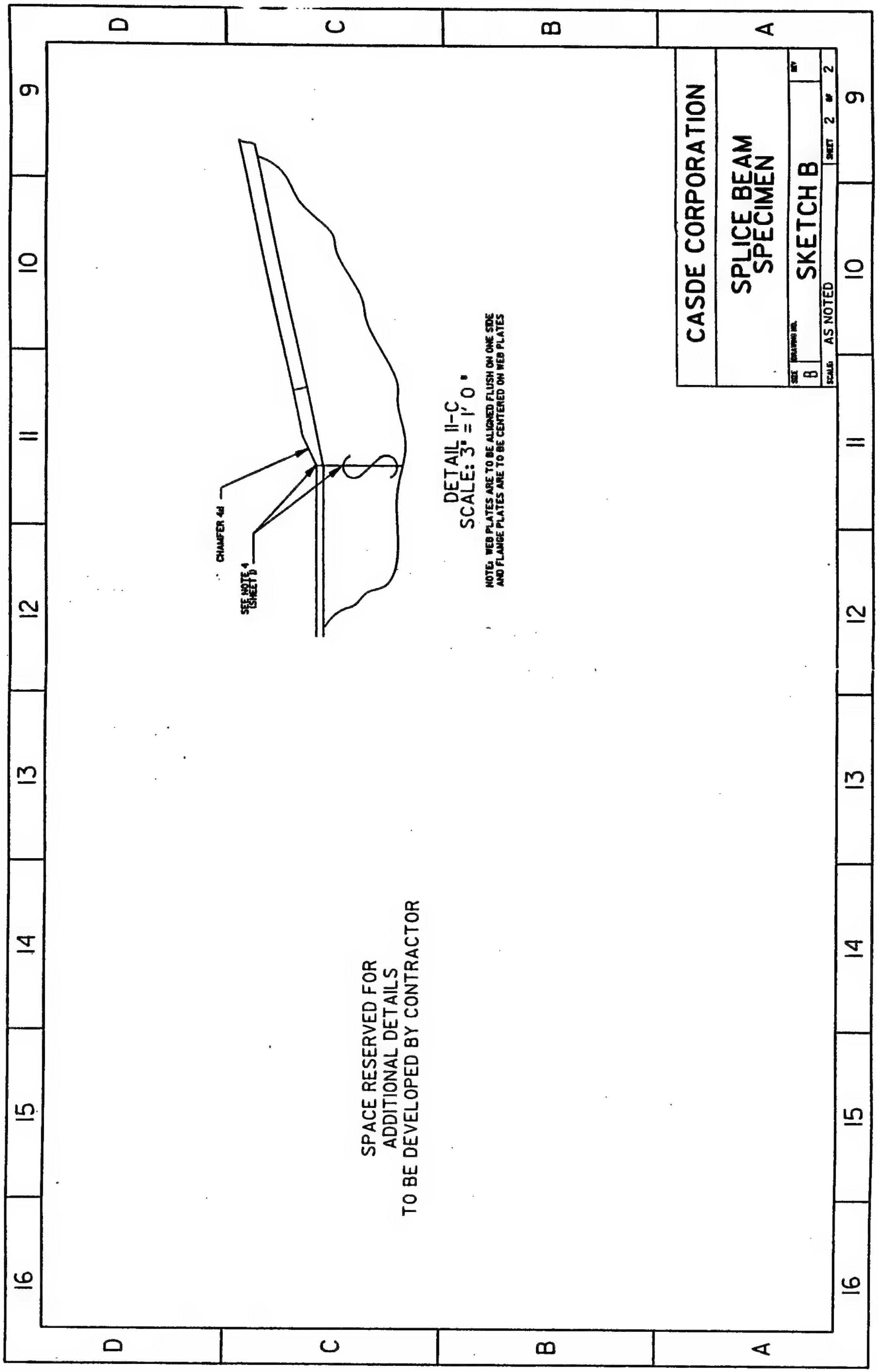
SCALE: 1-1/2" = 1' 0" | SHEET 1 OF 2

ATTACHMENT (A)


CASDE CORPORATION
LAPPED COLLAR SPECIMEN
SKETCH A
SCALE: 1-1/2" = 1' 0"
SECTION 9-D
SECTION 9-B
SECTION 13-D
SECTION 13-A
1/4" PL
1/4" (TYP BOTH PCS.)
3/16 PT2S.1 (TYP BOTH SIDES)
1/8 PT2.1 (TYP BOTH SIDES)
CLEARANCE HOLE IN VERTICAL PLATE
3/16" PL
LAPPED COLLAR PLATE DETAIL
WEB OF VERTICAL STIFFENER
LAPPED COLLAR PLATE



ATTACHMENT (A)

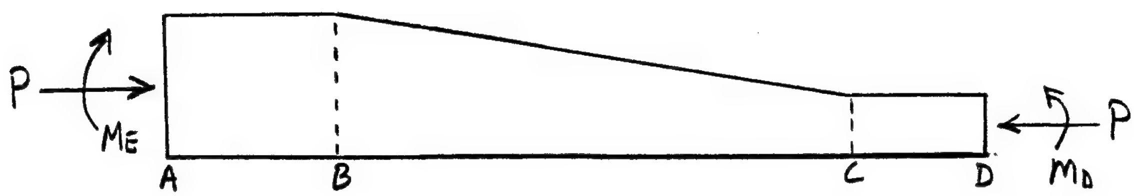

CHAMFER 4d
SEE NOTE 4
(SHEET D)
DETAIL 11-C
SCALE: 3" = 1' 0"
NOTE: WEB PLATES ARE TO BE ALIGNED FLUSH ON ONE SIDE
AND FLANGE PLATES ARE TO BE CENTERED ON WEB PLATES
SPACE RESERVED FOR
ADDITIONAL DETAILS
TO BE DEVELOPED BY CONTRACTOR
CASDE CORPORATION
SPLICE BEAM
SPECIMEN
SKETCH B
SIZE
B
DRAWING NO.
REV
SCALE: AS NOTED
SHEET 2 OF 2

Appendix D

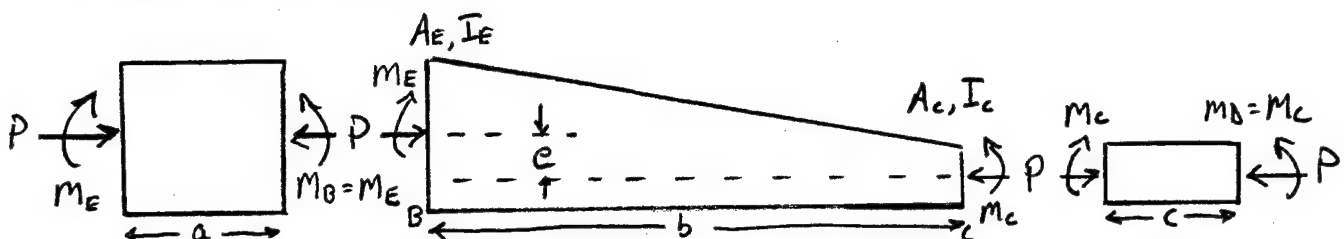
Stiffener Splice Component Stress Calculations

Stiffener Splice Component Stress Calculations

Consider the following member with externally applied axial loads and end moments. The entire member is assumed to be symmetric about "D".



The problem is to determine the stress at "C" in terms of the geometry and externally applied loads. To proceed, the member and loads shown above are separated into three free body diagrams.



Considering the middle free body diagram, the summation of moments about "B" is taken and set equal to zero.

$$\sum M_B = 0$$
$$M_E = M_C - Pe$$

Considering the first free body diagram, the rotation of end "B" can be calculated from the section properties and applied moments.

$$\theta_B = \int_0^a \frac{M_E}{EI}dx = \frac{M_E a}{EI_E}$$

Likewise, the rotation at the end "C" of the middle free body diagram can be calculated assuming linearly changing section properties and lines of action.

$$\theta_C = \frac{M_E a}{EI_E} + \int_0^b \frac{M_E + Pe(x/b)}{E(I_C - I_E)x/b + I_E} dx$$

$$\theta_C = \frac{M_E}{E}\left[\frac{a}{I_E} + \frac{b}{(I_C - I_E)}\log\left(\frac{I_C}{I_E}\right)\right] + \frac{Peb}{E(I_C - I_E)}\left[1 + \frac{I_E}{(I_C - I_E)}\log\left(\frac{I_E}{I_C}\right)\right]$$

The rotation at the end "C" of the third free body diagram can also be calculated.

$$\theta_C = -\frac{M_c c}{EI_c}$$

Setting the rotations at "C" equal to each other to satisfy continuity yields the following.

$$M_C = \frac{Pe\left(a + \frac{b(\log(\gamma) - 1)}{(\gamma - 1)} - \frac{b\log(1/\gamma)}{(\gamma - 1)^2}\right)}{\left(a + \frac{b\log(\gamma)}{(\gamma - 1)} + \frac{c}{\gamma}\right)}$$

For the geometry of the stiffener splice detail, the stress in the flange of the mid-length section is related to the applied axial load, P, by the following equation.

$$\sigma = \frac{P}{A} + \frac{M_C C_{f\lg}}{I_C}$$

$$\sigma_{ksi} = 0.5277\ P_{kips}$$

Appendix E

Fatigue Test Results

Fatigue Test Results

The following pages contain the results of many fatigue tests performed on a variety of welded structural details. The information contained in each set includes an abbreviated description of each detail, type of steel, type of loading, nominal thickness, fabricator and configuration. Also included in each set is a detail number that helps to distinguish details from one another in other tables in this report. The constant amplitude fatigue data, applied stress amplitude and cycles to failure, are presented along with statistics obtained from the regression analysis and a plot of the resulting S/N curve with data superimposed; data not used in the regression analysis are also listed. Results of tests conducted under random narrowband (Rayleigh distributed) loadings are included along with a figure of the test specimen showing the general size and configuration.

The following commentary provides a brief description of each test specimen detail. Detail #1 is a small cruciform shaped specimen, made of HSLA-80 steel, fabricated in a shipyard and tested under three point bending loads. The fillet welds are full penetration and the long piece of the specimen is continuous.

Details #2, #4, #6 and #7 are all continuous cruciform configurations of 1/4", 7/16", 3/4" and 1" thick HSLA-80 steel, respectively. They were fabricated in a shipyard. All specimens were tested under axial loads. The fillet welds are full penetration, but non-load carrying. Details #12 and #15 are similar, except that they were fabricated at NSWCCD of 1/2" thick high strength (HS) and ordinary strength (OS) steel, respectively.

Detail #3 is also a continuous cruciform, and identical to detail #4, except that fabrication was performed at NSWCCD. Detail #5 is therefore a combination of Detail #3 and Detail #4 data.

Detail #8 is a discontinuous cruciform, having load carrying full penetration fillet welds. Specimens were fabricated from 7/16" thick HSLA-80 plate at NSWCCD. Specimens were tested under axial load. Details #13 and #16 are similar, except that they were fabricated from 1/2" HS and OS steel plate, respectively, at NSWCCD. Detail #10

is also a discontinuous cruciform configuration, but with load carrying *partial* penetration fillet welds. Specimens were fabricated from 1/2" thick HSLA-80 steel at NSWCCD.

Detail #9 is a misaligned discontinuous cruciform. The loaded member is offset by half the thickness (1/4"). The specimens were fabricated at NSWCCD from 3/4" thick HSLA-80 steel plate machined down to 1/2" thickness. Fillet welds are all full penetration and load carrying. Details #14 and #17 are similar, except that they are fabricated from HS and OS steel plate, respectively. Detail #11 is also a misaligned discontinuous cruciform configuration, but with load carrying *partial* penetration fillet welds. Specimens were similarly fabricated at NSWCCD from 3/4" thick HSLA-80 steel, machined down to 1/2", and offset by 1/4".

Detail #18 is a large-scale "conventional" component representing the intersection of longitudinal deck plating and stiffener, with transverse bulkhead plating and stiffener. The deck plate contains a transverse, full-penetration butt weld. The bulkhead stiffener lands on toe brackets, and the deck stiffener contains lapped watertight collars where it penetrates the bulkhead plating. Plating and stiffener webs were made of 3/16" thick steel and the stiffener flanges were made of 1/4" thick steel. The type of steel (HS or HSLA-80) and the fabricator (shipyard or NSWCCD) are indicated with the data. Loads were applied axially through the calculated neutral axis. Loadings for this set of data were all "tension-only" at approximately R=0. Detail #19 was similar, except that the bulkhead stiffener is sniped back away from the deck stiffener and the watertight collars were flush instead of lapped. Detail #20 was similar to Detail 18, except the deck stiffener was discontinuous at the bulkhead plate and therefore no watertight collars were present. All Detail #19 and #20 specimens were made of HSLA-80 steel and loaded axially at approximately R=0. Detail #21 components were identical to the Detail #18 components. All were fabricated in a shipyard from HSLA-80 steel and loaded under fully reversed loadings. Dimensions of this component can be found in Appendix C. Each component was instrumented with strain gages that were monitored prior to testing.

Detail #22 represented a full-scale stiffener splice detail. Due to the shift in neutral axis, the relationship between applied load and resulting stress is contained in Appendix D. These components were fabricated in a shipyard from HSLA-80 steel and

axially loaded. Dimensions of this component can be found in Appendix C. Each component was instrumented with strain gages that were monitored prior to testing.

Detail #23 represents a large-scale reinforced opening detail. The opening is reinforced with coaming, which contains a butt weld, and heavier plating around the corners of the openings than at the center. These details were fabricated at NSWCCD from HSLA-80 steel. Dimensions can be found in Appendix C. Due to the complexity of the detail, applied axial load was based on the far field stress away from the opening. Each specimen was instrumented with strain gages that were monitored prior to testing.

Detail #24 was simply configured from 1/2" HSLA-80 baseplate that was flame-cut at NSWCCD into large "dog-bone" shaped specimens. No welding was applied to any of these specimens. Specimens were subjected to fully reversed axial load.

Detail #25 represents an insert plate, where 1/4" thick HSLA-80 plate is welded between two pieces of 1/2" thick HSLA-80 plate, maintaining a flush surface on one side. The welds were all full-penetration, however, examination of the first specimens tested revealed lack of penetration at the root of the weld. A new batch of "good weld" specimens was fabricated and designated Detail #25. The "poor weld" data were designated as Detail #26. Applied load was determined based on axial stress in the thinner plate. Specimens were fabricated at NSWCCD and subjected to fully reversed axial load.

Detail #27 represented a one-sided weld configuration with a permanent backing bar. Specimens were fabricated at NSWCCD from 1/2" thick HSLA-80 plate. Specimens were subjected to fully reversed axial load.

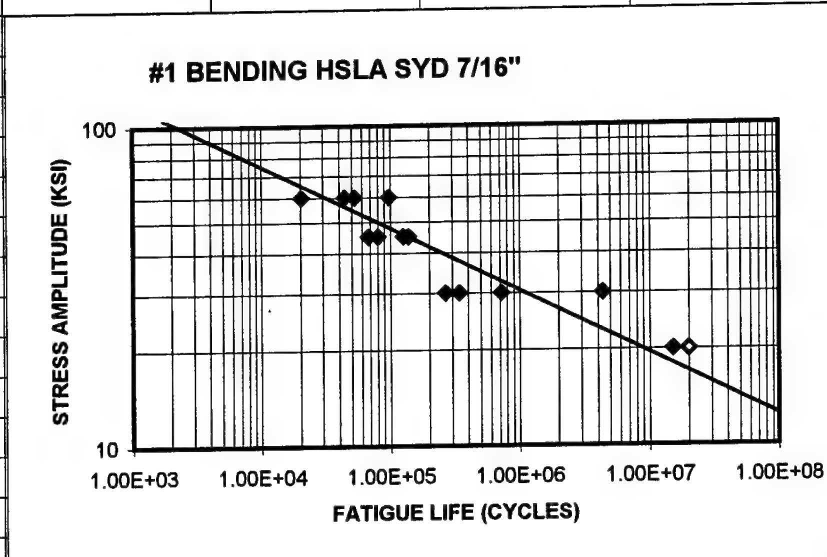
Detail #28 represented a doubler plate having the same thickness as the plate to which it was attached. The welds were initiated and terminated along the short edge of the doubler plate, transverse to the applied load. Detail #29 was similar to Detail #28, except that the doubler plate was twice the thickness of the plate to which it was attached. Both types of details were fabricated at NSWCCD from 1/2" HSLA-80 plate (and 1" thick HSLA-80 plate for the double thickness doubler specimen). Specimens were subjected to fully reversed axial load.

Data Index

#1 Bending HSLA SYD 7/16"

Steel Type:	HSLA-80
Loading:	Bending R=-1
Thickness:	7/16"
Fabricator:	Shipyard
Configuration:	Cruciform, non-load carrying fillet welds

Stress Amplitude (KSI)	Fatigue Life (Cycles)
60	20,300
60	52,500
60	44,100
60	97,100
45	79,600
45	138,000
45	126,000
45	67,200
30	264,800
30	340,800
30	720,700
30	4,360,800
20	19,849,400
20	15,125,600



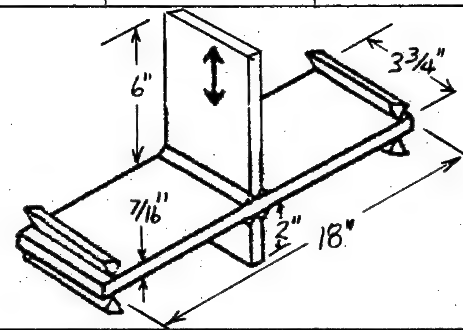
Regression Output:		
Intercept	log(Aamp)	13.617
	log(Arng)	15.161
Slope		-5.130
Std Err of Y Est		0.378
COV		0.581
R Squared		0.852
No. of Observations		14
Degrees of Freedom		12

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
20	20,000,000	Runout
20	20,000,000	Runout
12	2,609,900	Suspended

Random Fatigue Data (Narrowband, Zero Mean)

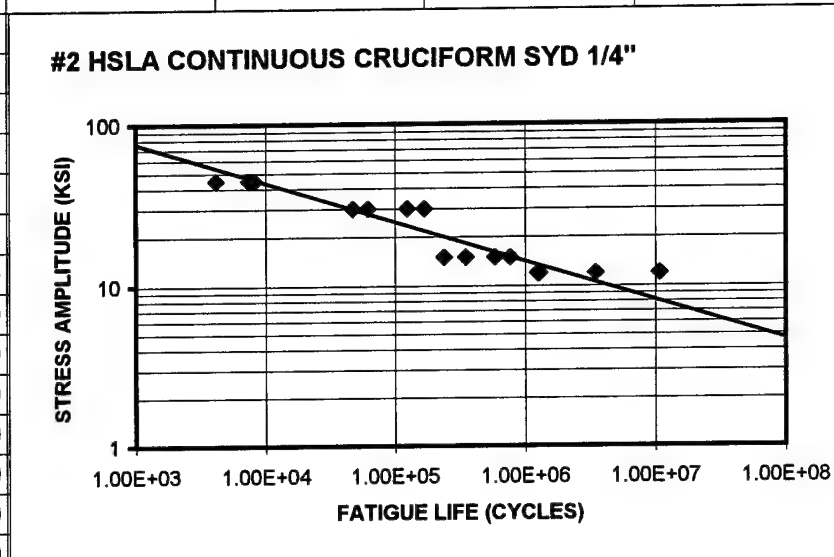
RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
10	6,969,900	
10	11,699,400	
10	1,603,100	
10	8,291,000	5,737,700
15	726,200	
15	2,085,400	
15	1,028,600	
15	759,100	1,042,800
22.5	172,000	
22.5	113,900	
22.5	221,900	
22.5	88,400	140,000



Random Fatigue Data (Narrowband, with Mean)

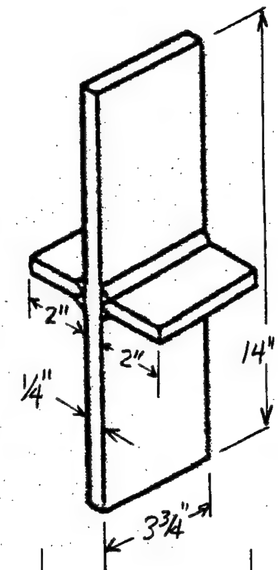
RMS Stress (KSI)	Mean Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
15	15	794,200	
15	15	600,300	
15	15	512,000	
15	15	1,254,400	743,900
15	60	218,100	
15	60	258,100	
15	60	252,900	
15	60	345,000	264,700

		#2 HSLA CONTINUOUS CRUCIFORM SYD 1/4"			
Steel Type:	HSLA-80				
Loading:	Axial R= -1				
Thickness:	1/4"				
Fabricator:	Shipyard				
Configuration:	Cruciform, continuous, non-load carrying fillet welds				
Stress Amplitude (KSI)	Fatigue Life (Cycles)				
12	3,470,700				
12	1,243,700				
12	1,288,500				
12	10,697,300				
15	348,000				
15	237,100				
15	764,700				
15	582,700				
30	167,500				
30	123,300				
30	47,100				
30	61,600				
45	4,130		Regression Output:		
45	7,390		Intercept	log(Aamp)	10.714
45	8,160			log(Arng)	11.944
45	7,510		Slope		-4.087
			Std Err of Y Est		0.350
			COV		0.554
			R Squared		0.892
			No. of Observations		16
			Degrees of Freedom		14

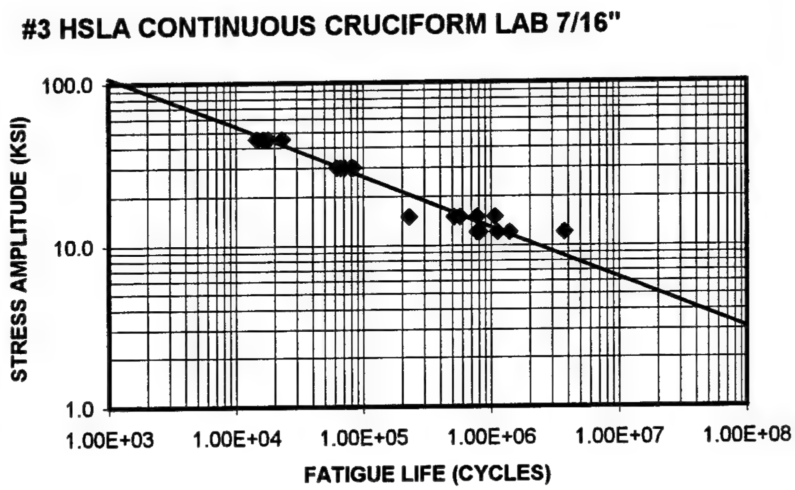


Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
4	6,216,900	
4	6,386,100	6,300,900
5	2,628,100	
5	2,028,400	
5	3,087,800	
5	3,908,200	2,832,100
10	228,800	
10	519,200	
10	531,200	
10	858,100	482,400
15	53,400	
15	35,200	
15	35,100	
15	46,000	41,700



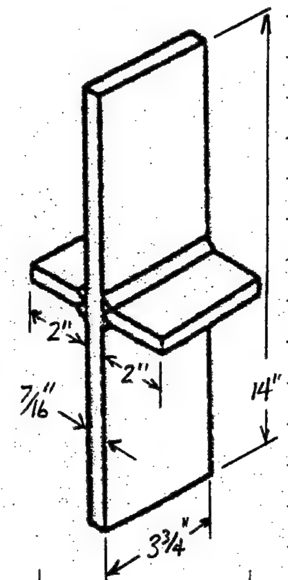
	#3 HSLA CONTINUOUS CRUCIFORM LAB 7/16"
Steel Type:	HSLA-80
Loading:	Axial R= -1
Thickness:	7/16"
Fabricator:	NSWC
Configuration:	Cruciform, continuous, non-load carrying fillet welds



Stress Amplitude (KSI)	Fatigue Life (Cycles)			
45	14,500			
45	14,800			
45	16,300			
45	23,200			
45	18,000			
30	66,500			
30	61,900			
30	70,600			
30	82,800			
30	79,100			
15	572,000			
15	779,500			
15	515,000	Regression Output:		
15	229,200	Intercept	log(Aamp)	9.559
15	1,071,600		log(Arng)	10.525
12	775,600	Slope		-3.210
12	3,732,900	Std Err of Y Est		0.185
12	1,118,600	COV		0.346
12	810,800	R Squared		0.947
12	1,392,000	No. of Observations		20
		Degrees of Freedom		18

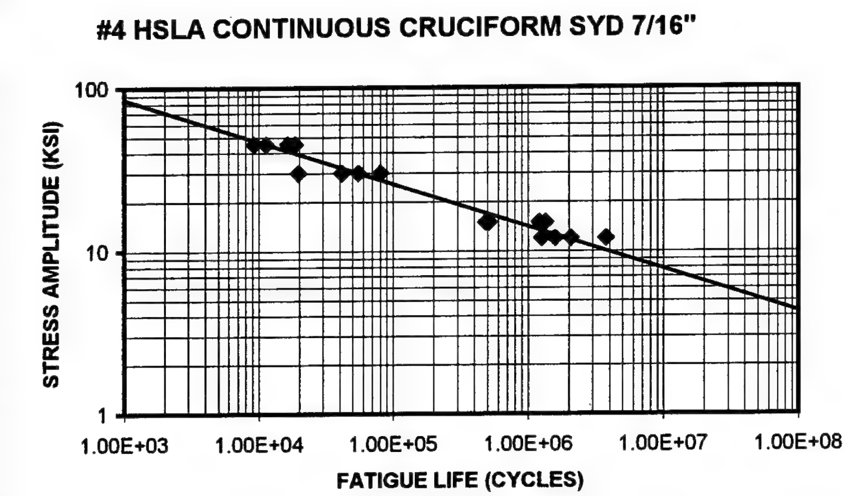
Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
4	16,113,100	
4	24,154,300	
4	50,539,400	
4	4,407,800	17,159,600
5	2,685,000	
5	5,496,200	
5	7,863,200	
5	4,240,000	4,709,700
7.5	1,504,200	
7.5	1,111,300	
7.5	1,178,100	
7.5	1,216,300	1,244,100
10	488,000	
10	686,700	
10	901,700	
10	463,000	611,600
15	93,600	
15	112,600	
15	128,000	
15	141,200	117,500
22.5	13,200	
22.5	13,000	
22.5	14,300	
22.5	17,300	14,400



		#4 HSLA CONTINUOUS CRUCIFORM SYD 7/16"			
Steel Type:	HSLA-80				
Loading:	Axial R= -1				
Thickness:	7/16"				
Fabricator:	Shipyard				
Configuration:	Cruciform, continuous, non-load carrying fillet welds				

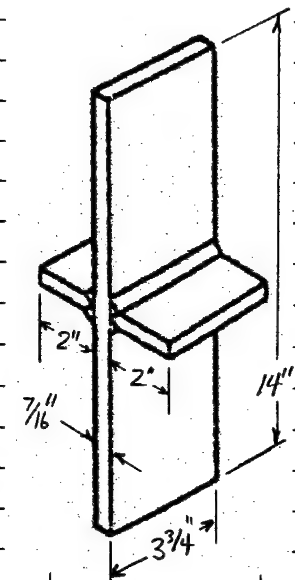
Stress Amplitude (KSI)	Fatigue Life (Cycles)
12	3,754,600
12	2,073,800
12	1,262,100
12	1,586,500
15	1,346,500
15	487,100
15	512,600
15	1,206,900
30	54,800
30	19,600
30	80,600
30	41,400
45	9,230
45	16,430
45	11,310
45	18,660



Regression Output:		
Intercept	log(Aamp)	10.432
	log(Arng)	11.592
Slope		-3.855
Std Err of Y Est		0.210
COV		0.383
R Squared		0.953
No. of Observations		16
Degrees of Freedom		14

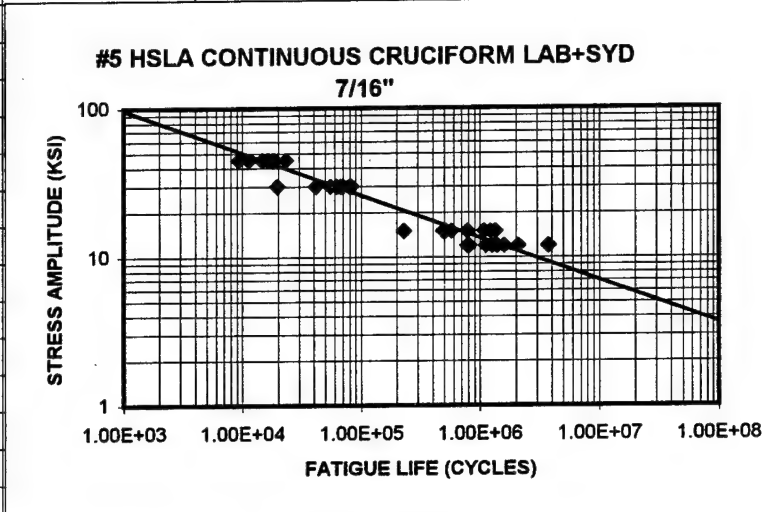
Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
4	18,229,100	
4	7,236,000	11,485,000
5	4,002,000	
5	5,829,700	
5	5,102,600	
5	4,578,400	4,831,800
10	474,500	
10	283,100	
10	315,300	
10	821,000	431,800
15	93,000	
15	63,900	
15	53,600	
15	103,400	75,800



#5 HSLA CONTINUOUS CRUCIFORM LAB+SYD 7/16"

Steel Type:	HSLA-80
Loading:	Axial R= -1
Thickness:	7/16"
Fabricator:	Shipyard & NSWC
Configuration:	Cruciform, continuous, non-load carrying fillet welds

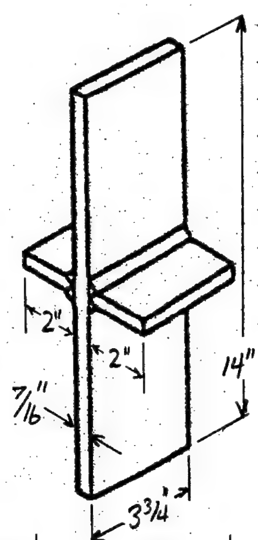


Stress Amplitude (KSI)	Fatigue Life (Cycles)
12	3,754,600
12	2,073,800
12	1,262,100
12	1,586,500
15	1,346,500
15	487,100
15	512,600
15	1,206,900
30	54,800
30	19,600
30	80,600
30	41,400
45	9,230
45	16,430
45	11,310
45	18,660
12	775,600
12	3,732,900
12	1,118,600
12	810,800
12	1,392,000
15	572,000
15	779,500
15	515,000
15	229,200
15	1,071,600
30	66,500
30	61,900
30	70,600
30	82,800
30	79,100
45	14,500
45	14,800
45	16,300
45	23,200
45	18,000

Regression Output:		
Intercept	log(Aamp)	9.947
	log(Arng)	10.999
Slope		-3.496
Std Err of Y Est		0.205
COV		0.376
R Squared		0.942
No. of Observations		36
Degrees of Freedom		34

Random Fatigue Data (Narrowband, Zero Mean)

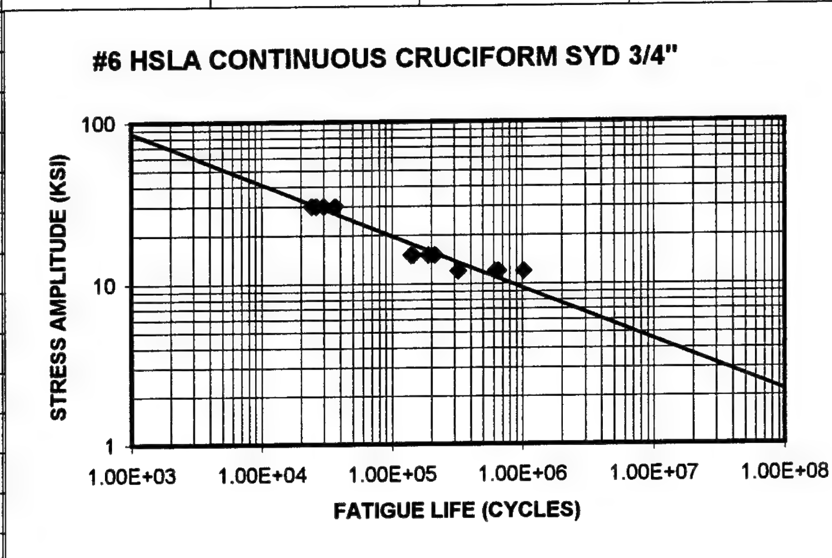
RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
4	18,229,100	
4	7,236,000	
4	16,113,100	
4	24,154,300	
4	50,539,400	
4	4,407,800	15,010,000
5	4,002,000	
5	5,829,700	
5	5,102,600	
5	4,578,400	
5	2,685,000	
5	5,496,200	
5	7,863,200	
5	4,240,000	4,770,300
7.5	1,504,200	
7.5	1,111,300	
7.5	1,178,100	
7.5	1,216,300	1,244,100
10	474,500	
10	283,100	
10	315,300	
10	821,000	
10	488,000	
10	686,700	
10	901,700	
10	463,000	513,900
15	93,000	
15	63,900	
15	53,600	
15	103,400	
15	93,600	
15	112,600	
15	128,000	
15	141,200	94,300
22.5	13,200	
22.5	13,000	
22.5	14,300	
22.5	17,300	14,400



#6 HSLA CONTINUOUS CRUCIFORM SYD 3/4"

Steel Type:	HSLA-80
Loading:	Axial R= -1
Thickness:	3/4"
Fabricator:	Shipyard
Configuration:	Cruciform, continuous, non-load carrying fillet welds

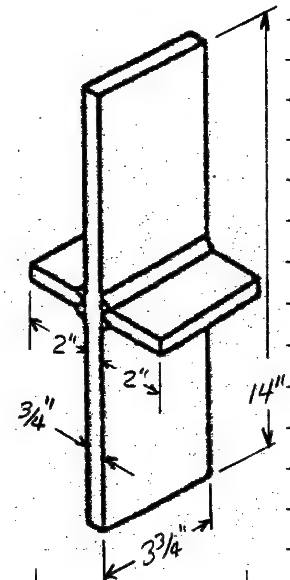
Stress Amplitude (KSI)	Fatigue Life (Cycles)
12	1,013,600
12	625,200
12	652,500
12	322,100
15	213,600
15	190,800
15	141,100
15	145,000
30	36,700
30	26,200
30	24,300
30	30,100



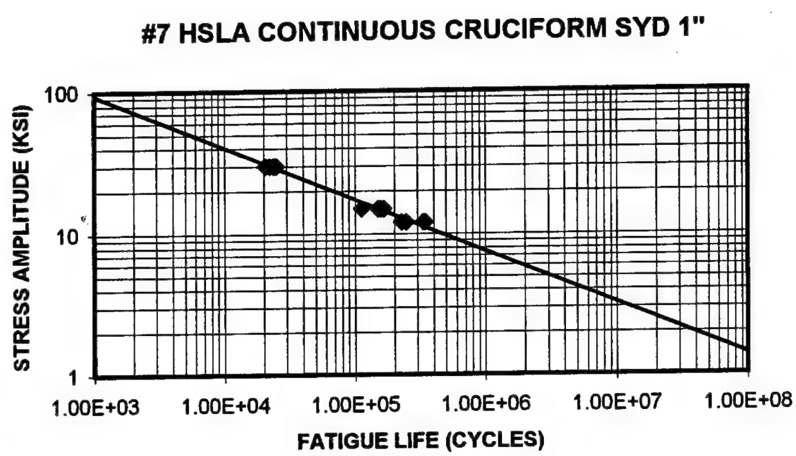
Regression Output:		
Intercept	log(Aamp)	9.057
	log(Arng)	10.000
Slope		-3.134
Std Err of Y Est		0.173
COV		0.328
R Squared		0.919
No. of Observations		12
Degrees of Freedom		10

Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
4	3,359,800	
4	2,862,900	
4	2,412,900	
4	3,905,700	3,085,600
5	1,381,800	
5	1,253,000	
5	1,289,100	
5	1,306,600	1,306,800
10	148,100	
10	138,000	
10	133,000	
10	179,300	148,600



		#7 HSLA CONTINUOUS CRUCIFORM SYD 1"
Steel Type:	HSLA-80	
Loading:	Axial R= -1	
Thickness:	1"	
Fabricator:	Shipyard	
Configuration:	Cruciform, continuous, non-load carrying fillet welds	

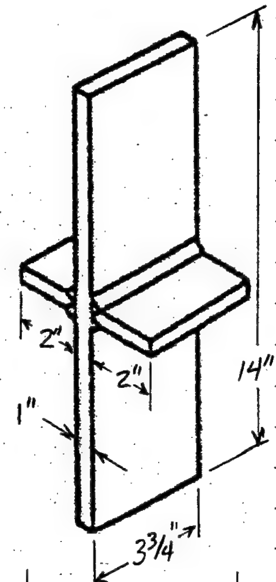


Stress Amplitude (KSI)	Fatigue Life (Cycles)
12	332,600
12	246,900
12	226,800
12	342,200
15	112,800
15	167,100
15	157,200
15	150,500
30	22,200
30	23,700
30	24,700
30	20,600

Regression Output:		
Intercept	log(Aamp)	8.389
	log(Arng)	9.211
Slope		-2.732
Std Err of Y Est		0.068
COV		0.145
R Squared		0.982
No. of Observations		12
Degrees of Freedom		10

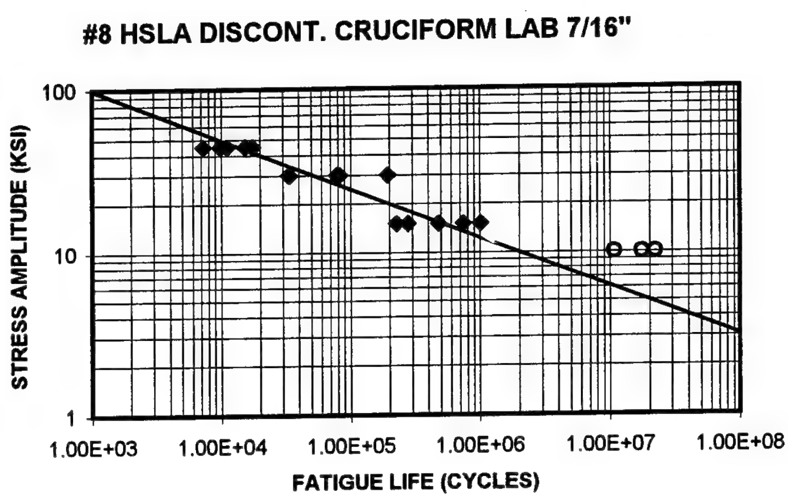
Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
4	2,801,800	
4	2,361,500	
4	2,912,000	
4	2,007,800	2,493,900
5	1,174,900	
5	903,000	
5	830,600	
5	1,046,600	980,000
10	148,100	
10	144,200	
10	164,300	
10	134,600	147,400



#8 HSLA DISCONTINUOUS CRUCIFORM LAB 7/16"

Steel Type:	HSLA-80
Loading:	Axial R= -1
Thickness:	7/16"
Fabricator:	NSWC
Configuration:	Cruciform, discontinuous, load carrying fillet welds



Stress Amplitude (KSI)	Fatigue Life (Cycles)
15	276,500
15	1,011,300
15	744,100
15	227,300
15	479,400
30	192,800
30	33,400
30	82,100
30	33,200
30	78,400
45	17,500
45	15,300
45	11,100
45	7,190
45	9,830

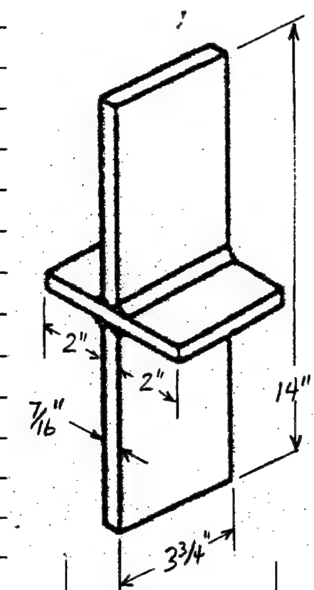
Regression Output:		
Intercept	log(Aamp)	9.601
	log(Arng)	10.597
Slope		-3.306
Std Err of Y Est		0.263
COV		0.454
R Squared		0.876
No. of Observations		15
Degrees of Freedom		13

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
10	17,625,500	Suspended
10	1,382,400	
10	1,455,900	
10	22,166,000	Runout
10	10,841,600	Suspended

Random Fatigue Data (Narrowband, Zero Mean)

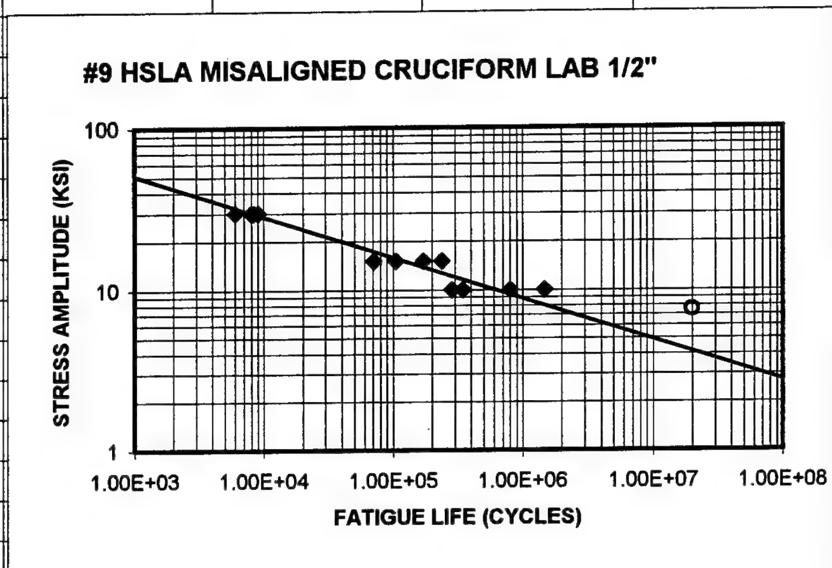
RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	2,558,800	
5	3,008,200	
5	3,184,200	
5	17,960,800	4,580,500
7.5	793,300	
7.5	1,972,100	
7.5	2,563,100	
7.5	1,120,900	1,456,000
10	177,500	
10	965,200	
10	425,400	
10	383,100	408,800
15	108,100	
15	82,400	
15	140,700	
15	101,700	106,300
22.5	15,200	
22.5	17,000	
22.5	17,500	
22.5	14,200	15,900



#9 HSLA MISALIGNED CRUCIFORM LAB 1/2"

Steel Type:	HSLA-80
Loading:	Axial R= -1
Thickness:	1/2"
Fabricator:	NSWC
Configuration:	Cruciform, misaligned, load carrying fillet welds

Stress Amplitude (KSI)	Fatigue Life (Cycles)
10	1,472,900
10	792,100
10	344,500
10	283,900
15	170,700
15	237,600
15	104,900
15	70,500
30	9,020
30	7,930
30	5,970
30	8,350



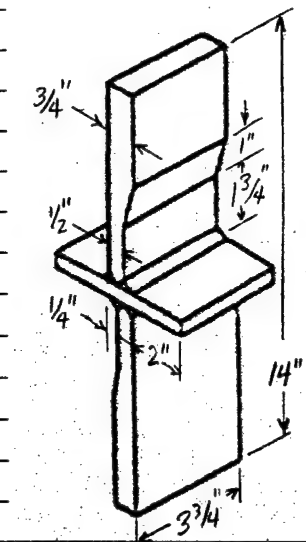
Regression Output:		
Intercept	log(Aamp)	9.733
	log(Arng)	10.922
Slope		-3.949
Std Err of Y Est		0.227
COV		0.407
R Squared		0.934
No. of Observations		12
Degrees of Freedom		10

Constant amplitude data not used

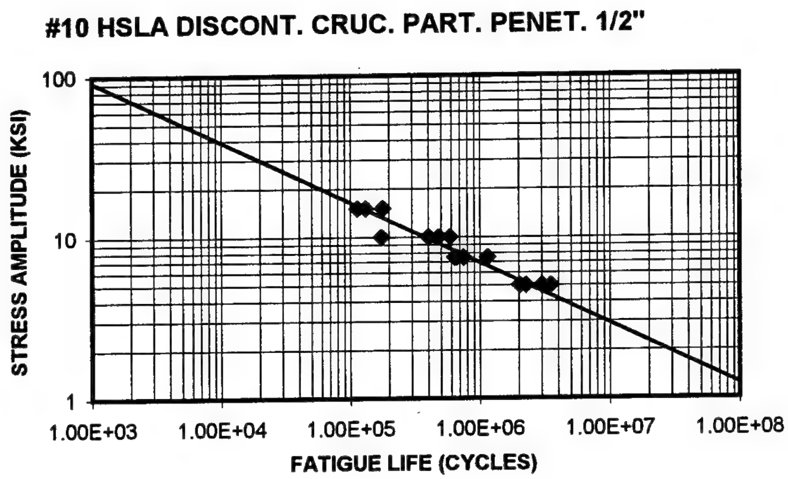
Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
7.5	20,041,600	Suspended
7.5	20,136,200	Suspended
7.5	212,400	
7.5	801,200	

Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	1,639,300	
5	1,147,100	
5	458,100	
5	598,100	847,200



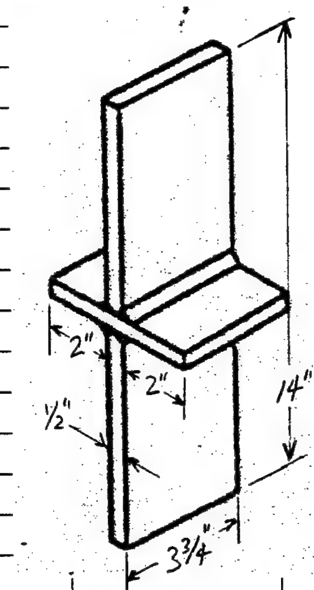
	#10 HSLA DISCONT. CRUCIFORM PARTIAL PENETRATION 1/2"
Steel Type:	HSLA-80
Loading:	Axial R= -1
Thickness:	1/2"
Fabricator:	NSWC
Configuration:	Cruciform, discontinuous, partial penetration load carrying fillet welds



Stress Amplitude (KSI)	Fatigue Life (Cycles)
5	2,264,200
5	2,018,500
5	3,495,700
5	2,994,900
7.5	749,800
7.5	655,400
7.5	638,100
7.5	1,147,700
10	477,900
10	173,100
10	586,900
10	399,900
15	130,700
15	131,100
15	177,000
15	112,600

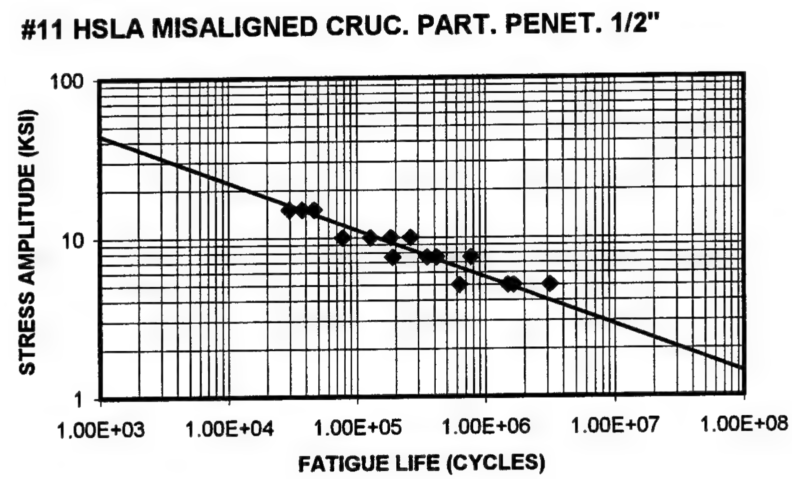
Regression Output:		
Intercept	log(Aamp)	8.272
	log(Arng)	9.081
Slope		-2.686
Std Err of Y Est		0.139
COV		0.274
R Squared		0.929
No. of Observations		16
Degrees of Freedom		14

Random Fatigue Data (Narrowband, Zero Mean)		
RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	1,351,500	
5	594,500	
5	1,208,400	
5	737,100	919800



	#11 HSLA MISALIGNED CRUCIFORM PARTIAL PENETRATION 1/2"
Steel Type:	HSLA-80
Loading:	Axial R= -1
Thickness:	1/2"
Fabricator:	NSWC
Configuration:	Cruciform, misaligned, partial penetration load carrying fillet welds

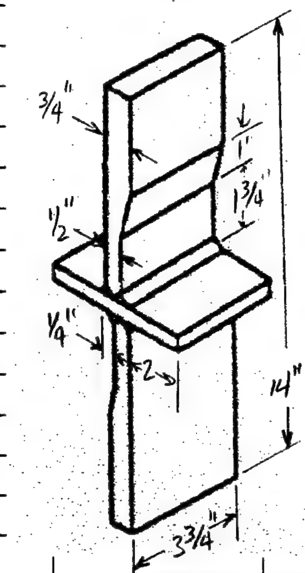
Stress Amplitude (KSI)	Fatigue Life (Cycles)
5	1,476,500
5	624,600
5	3,149,600
5	1,645,500
7.5	414,300
7.5	763,800
7.5	349,800
7.5	190,700
10	182,500
10	77,400
10	260,600
10	127,800
15	37,200
15	46,500
15	37,200
15	29,700



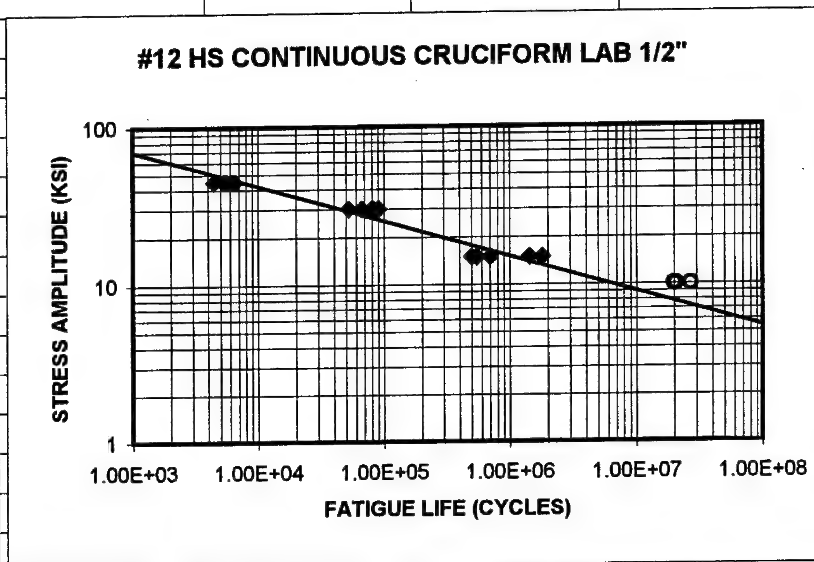
Regression Output:		
Intercept	log(Aamp)	8.513
	log(Arng)	9.521
Slope		-3.349
Std Err of Y Est		0.208
COV		0.380
R Squared		0.900
No. of Observations		16
Degrees of Freedom		14

Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	136,300	
5	153,200	
5	263,600	
5	248,400	192,300



		#12 HS CONTINUOUS CRUCIFORM LAB 1/2"			
Steel Type:	HS				
Loading:	Axial R= -1				
Thickness:	1/2"				
Fabricator:	NSWC				
Configuration:	Cruciform, continuous, non-load carrying fillet welds				



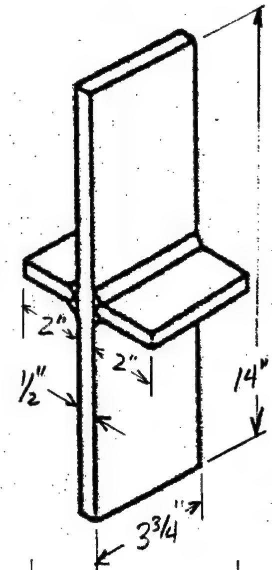
Stress Amplitude (KSI)	Fatigue Life (Cycles)				
15	546900				
15	1,435,800				
15	1,810,700				
15	693,700				
15	499,700				
30	66,500				
30	90,600				
30	52,400				
30	80,200				
30	82,200				
45	5,600				
45	6,500				
45	4,420		Regression Output:		
45	5,340		Intercept	log(Aamp)	11.289
45	6,220			log(Arng)	12.639
			Slope		-4.486
			Std Err of Y Est		0.218
			COV		0.395
			R Squared		0.950
			No. of Observations		15
			Degrees of Freedom		13

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
10	20,572,200	Runout
10	20,106,700	Runout
10	20,031,600	Runout
10	20,071,600	Runout
10	26,215,600	Runout

Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	5,413,400	
5	7,069,300	
5	4,354,300	
5	12,315,000	6,730,500
7.5	2,132,400	
7.5	1,254,300	
7.5	2,518,300	
7.5	1,392,500	1,750,000
10	403,400	
10	518,900	
10	452,500	
10	706,100	508,500

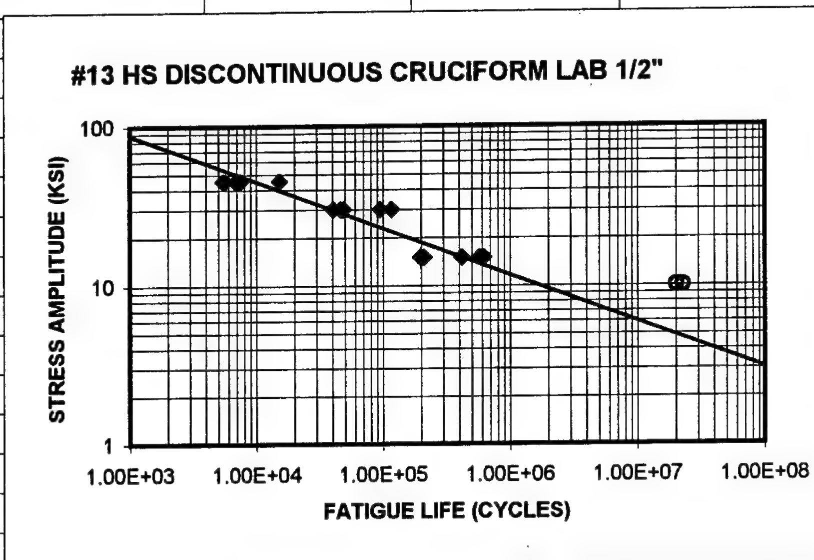


Constant Amplitude Fatigue Data (Non-zero Mean)

Stress Amplitude (KSI)	Mean Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
10	10	1,715,600	
10	10	2,948,900	
10	10	1,446,800	
10	10	9,691,000	2,902,100
10	20	1,290,300	
10	20	862,100	
10	20	7,042,800	
10	20	5,542,700	2,567,000
15	15	680,400	
15	15	638,800	
15	15	341,700	
15	15	325,100	468,800
15	30	606,900	
15	30	564,600	
15	30	244,400	
15	30	413,200	431,300

		#13 HS DISCONTINUOUS CRUCIFORM LAB 1/2"
Steel Type:	HS	
Loading:	Axial R= -1	
Thickness:	1/2"	
Fabricator:	NSWC	
Configuration:	Cruciform, discontinuous, non-load carrying fillet welds	

Stress Amplitude (KSI)	Fatigue Life (Cycles)
15	614,400
15	417,300
15	208,700
15	575,600
15	196,900
30	115,500
30	46,500
30	93,900
30	48,600
30	40,100
45	15,200
45	5,600
45	5,440
45	6,860
45	7,410



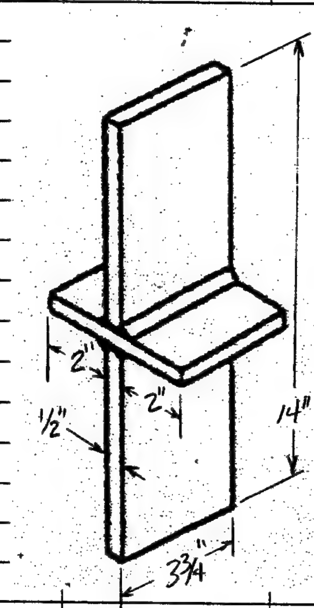
Regression Output:		
Intercept	log(Aamp)	9.648
	log(Arng)	10.677
Slope		-3.417
Std Err of Y Est		0.252
COV		0.440
R Squared		0.892
No. of Observations		15
Degrees of Freedom		13

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
10	22,627,400	Runout
10	894,900	
10	20,076,000	Runout
10	20,245,800	Runout
10	305,900	

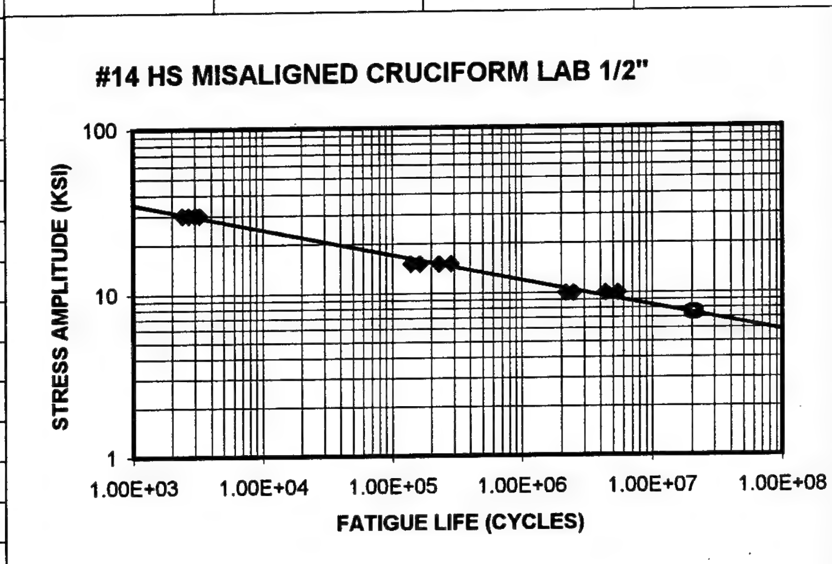
Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	20,009,900	
5	4,763,600	
5	11,667,700	
5	3,888,300	8,109,300
7.5	1,555,600	
7.5	776,700	
7.5	854,200	
7.5	3,581,300	1,386,600
10	545,300	
10	193,200	
10	587,400	
10	408,100	398,600



		#14 HS MISALIGNED CRUCIFORM LAB 1/2"			
Steel Type:	HS				
Loading:	Axial R= -1				
Thickness:	1/2"				
Fabricator:	NSWC				
Configuration:	Cruciform, misaligned, load carrying fillet welds				

Stress Amplitude (KSI)	Fatigue Life (Cycles)
10	2,483,500
10	2,171,300
10	4,360,400
10	5,415,000
15	139,400
15	228,000
15	283,600
15	163,000
30	3,250
30	2,390
30	2,670
30	2,990



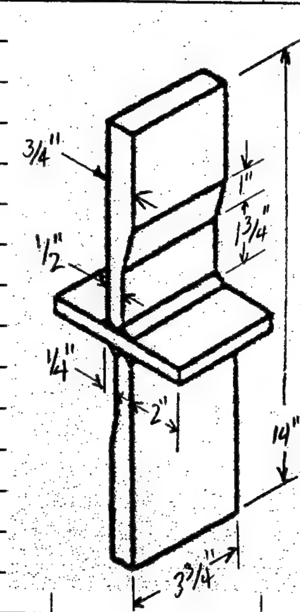
Regression Output:		
Intercept	log(Aamp)	12.902
	log(Arng)	14.833
Slope		-6.416
Std Err of Y Est		0.142
COV		0.280
R Squared		0.990
No. of Observations		12
Degrees of Freedom		10

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
7.5	21,635,000	Runout
7.5	1,063,300	
7.5	20,023,100	Runout
7.5	4,587,900	

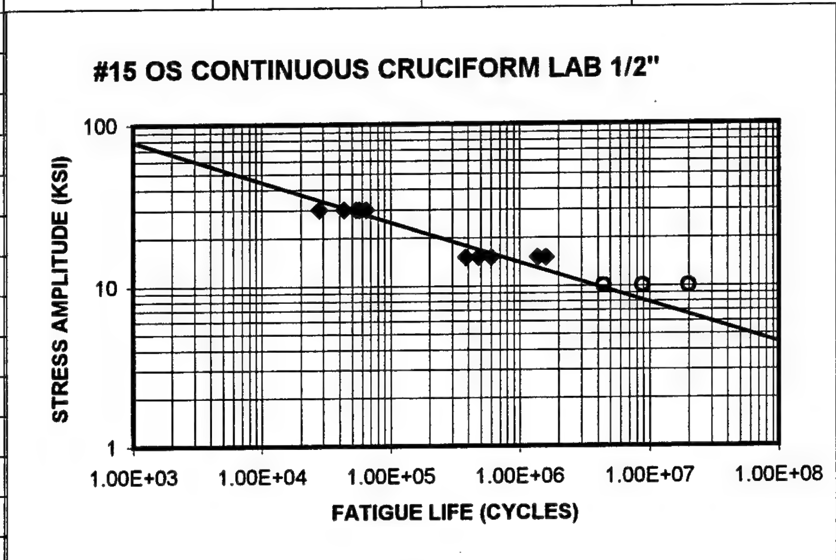
Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	902,700	
5	1,148,000	
5	556,700	
5	841,000	834,600



		#15 OS CONTINUOUS CRUCIFORM LAB 1/2"			
Steel Type:	OS				
Loading:	Axial R= -1				
Thickness:	1/2"				
Fabricator:	NSWC				
Configuration:	Cruciform, continuous, non-load carrying fillet welds				

Stress Amplitude (KSI)	Fatigue Life (Cycles)
15	478,900
15	382,800
15	1,591,900
15	597,700
15	1,377,500
30	53,700
30	43,600
30	27,900
30	64,100
30	57,200



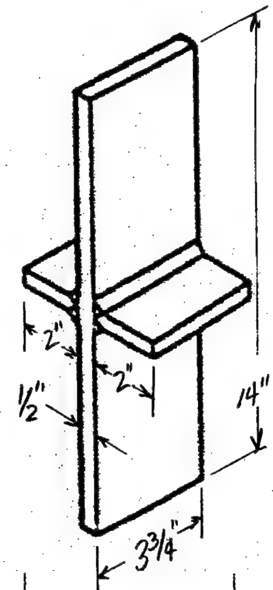
Regression Output:		
Intercept	log(Aamp)	10.566
	log(Arng)	11.766
Slope		-3.987
Std Err of Y Est		0.221
COV		0.399
R Squared		0.902
No. of Observations		10
Degrees of Freedom		8

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
10	4,769,000	
10	20,000,000	Runout
10	8,905,200	
10	20,010,000	Runout
10	20,000,000	Runout

Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	11,189,200	
5	5,488,200	
5	2,868,200	
5	9,242,400	6,351,900
7.5	669,200	
7.5	1,330,800	
7.5	924,300	
7.5	792,600	898,700
10	414,300	
10	762,400	
10	231,300	
10	358,100	402,200

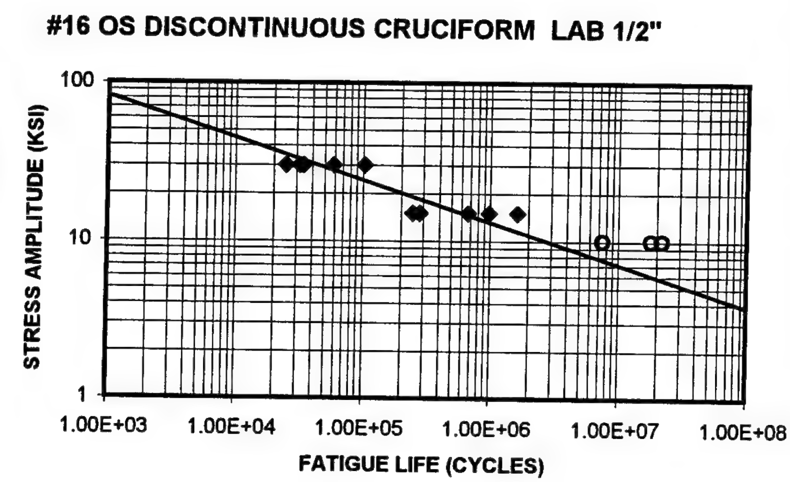


Constant Amplitude Fatigue Data (Non-zero Mean)

Stress Amplitude (KSI)	Mean Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
10	10	1,231,200	
10	10	897,700	
10	10	2,259,200	
10	10	4,465,700	1,827,400
10	20	5,975,100	
10	20	1,630,100	
10	20	2,547,300	
10	20	4,221,800	3,199,100
15	15	444,000	
15	15	344,000	
15	15	350,500	
15	15	481,200	400,600

		#16 OS DISCONTINUOUS CRUCIFORM LAB 1/2"
Steel Type:	OS	
Loading:	Axial R= -1	
Thickness:	1/2"	
Fabricator:	NSWC	
Configuration:	Cruciform, discontinuous, load carrying fillet welds	

Stress Amplitude (KSI)	Fatigue Life (Cycles)
15	1,628,000
15	247,400
15	279,900
15	975,100
15	666,700
30	103,200
30	24,800
30	31,900
30	34,200
30	59,200



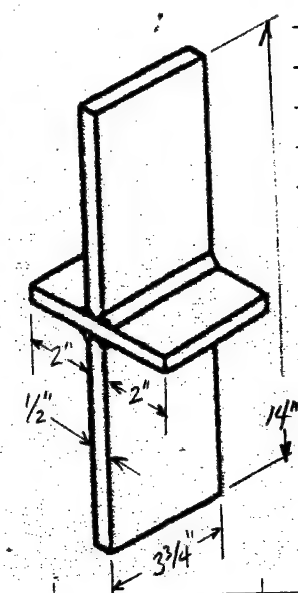
Regression Output:		
Intercept	log(Aamp)	10.185
	log(Arng)	11.314
Slope		-3.752
Std Err of Y Est		0.304
COV		0.503
R Squared		0.812
No. of Observations		10
Degrees of Freedom		8

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
10	17,969,400	Runout
10	20,784,100	Runout
10	580,500	
10	1,865,900	
10	7,489,500	

Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
7.5	1,777,800	
7.5	504,300	
7.5	1,187,300	
7.5	1,409,900	1106800
10	201,300	
10	107,000	
10	164,000	
10	319,300	183300

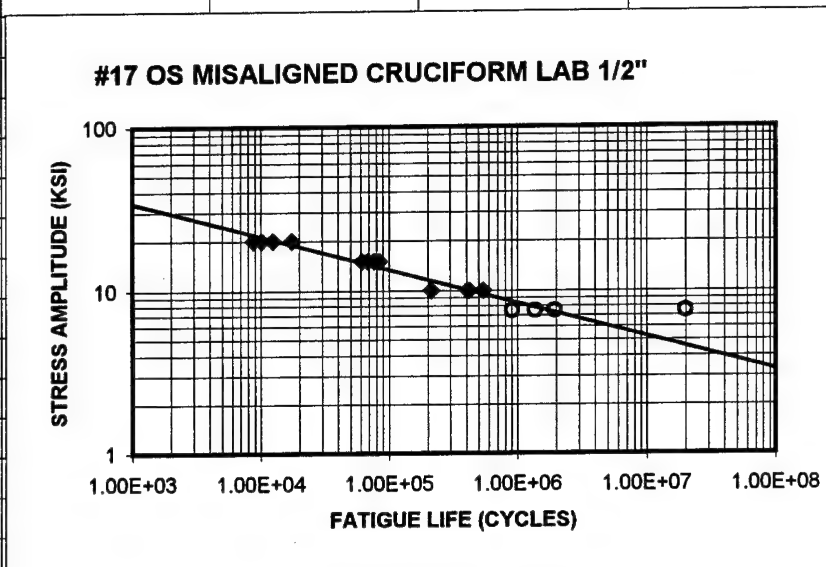


Random Amplitude Fatigue Data not used

RMS Stress (KSI)	Fatigue Life (Cycles)	Comments
5	20,155,000	Runout
5	3,061,600	
5	4,508,400	
5	5,436,700	

		#17 OS MISALIGNED CRUCIFORM LAB 1/2"
Steel Type:	OS	
Loading:	Axial R= -1	
Thickness:	1/2"	
Fabricator:	NSWC	
Configuration:	Cruciform, misaligned, load carrying fillet welds	

Stress Amplitude (KSI)	Fatigue Life (Cycles)
10	538,200
10	212,900
10	417,700
10	404,300
15	61,900
15	83,900
15	76,700
15	68,200
20	17,500
20	12,400
20	8,750
20	10,100



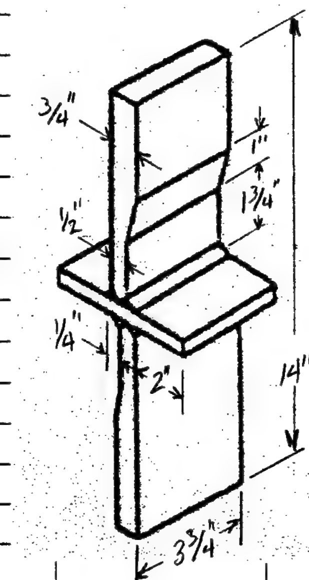
Regression Output:		
Intercept	log(Aamp)	10.541
	log(Arng)	12.023
Slope		-4.924
Std Err of Y Est		0.149
COV		0.290
R Squared		0.953
No. of Observations		12
Degrees of Freedom		10

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
7.5	907,800	
7.5	1,374,600	
7.5	2,074,400	
7.5	20,000,000	Runout

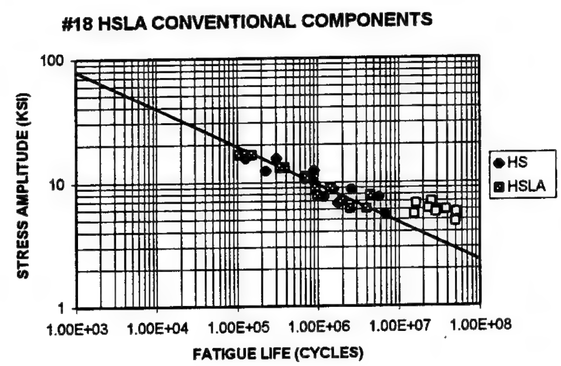
Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	1,407,500	
5	1,214,200	
5	776,200	
5	1,515,000	1,190,600



		#18 CONVENTIONAL STRUC. COMP. (APPROX R=0)				
Steel Type:	HS/HSLA					
Loading:	Axial R=0					
Thickness:	N/A					
Fabricator:	Shipyard & NSWC					
Configuration:	Conventional stiffener/bulkhead joint component					

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Fabricator
15.5	126,150	HS/SYD
12.3	224,550	HS/SYD
10.55	690,000	HS/SYD
8.75	1,559,810	HS/SYD
7.55	1,193,900	HS/SYD
6.75	1,761,000	HS/SYD
15.5	310,350	HS/LAB
12.3	887,450	HS/LAB
10.55	834,860	HS/LAB
8.75	2,586,810	HS/LAB
7.55	5,763,900	HS/LAB
5.5	6,938,100	HS/LAB
16.6	152,950	HSLA/SYD
13	392,300	HSLA/SYD
11.1	703,170	HSLA/SYD
9.05	1,438,000	HSLA/SYD
7.8	4,453,420	HSLA/SYD
6.1	2,502,800	HSLA/SYD
16.65	103,010	HSLA/LAB
13.05	339,910	HSLA/LAB
9.1	927,040	HSLA/LAB
7.85	981,270	HSLA/LAB
7	2,030,830	HSLA/LAB
6.1	4,039,940	HSLA/LAB



Regression Output:		
Intercept	log(Aamp)	9.192
	log(Arng)	10.174
Slope		-3.263
Std Err of Y Est		0.214
COV		0.389
R Squared		0.837
No. of Observations		24
Degrees of Freedom		22

Constant amplitude data not used

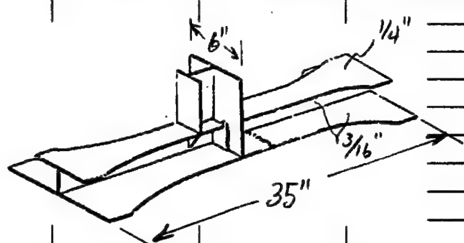
Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments	
5.95	34333480	SUSPENDED	HS/ISD
5.5	15614100		HS/ISD
6.75	16356500		HS/LAB
5.95	38229150	SUSPENDED	HS/LAB
6.95	25467460		HSLA/SYD
6.1	22962600		HSLA/SYD
5.65	50804500	SUSPENDED	HSLA/SYD
5.65	28899840		HSLA/LAB
4.75	50545730	SUSPENDED	HSLA/LAB

Random Fatigue Data (Narrowband, Zero Mean)

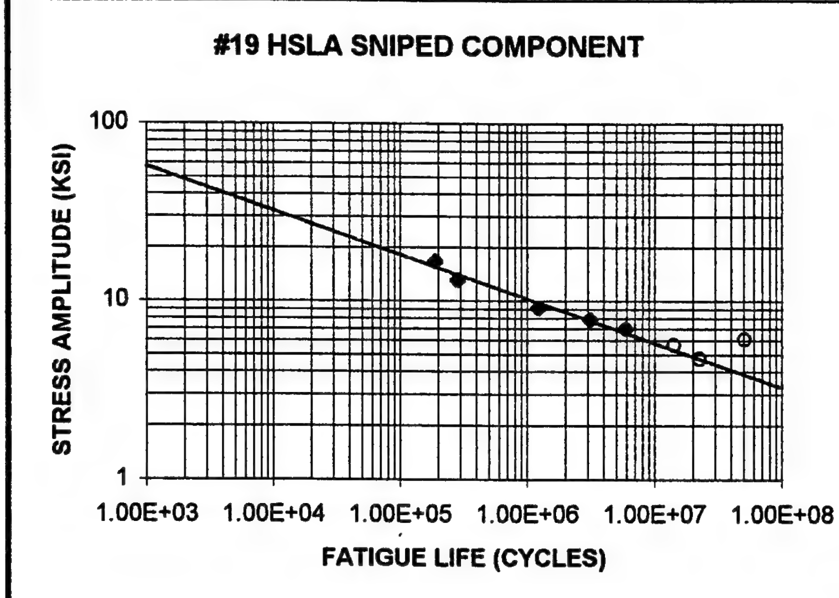
RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	3,267,500	
5	2,099,200	
5	4,435,000	
5	2,617,100	2,987,100

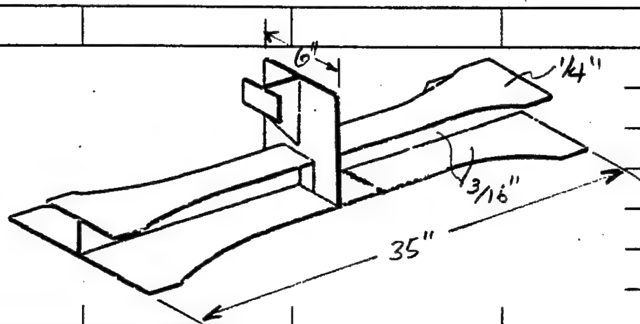
Random Fatigue Data (Narrowband, with Mean)

RMS Stress (KSI)	Mean Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	7.8	3,265,000	
5	7.8	1,554,200	
5	7.8	2,268,200	
5	7.8	2,141,400	2,228,100
7	7.8	935,000	
7	7.8	973,000	
7	7.8	1,111,700	
7	7.8	757,300	935,500



		#19 SNIPED STRUCTURAL COMP. (APPROX R=0)			
Steel Type:	HSLA				
Loading:	Axial R=0				
Thickness:	N/A				
Fabricator:	NSWC				
Configuration:	Sniped stiffener/bulkhead joint component				
Stress Amplitude (KSI)	Fatigue Life (Cycles)				
6.975	5,910,270				
7.835	3,081,810				
9.09	1,214,120				
13.045	281,970				
16.665	188,790				
Constant amplitude data not used					
Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments			
5.66	14,180,800	Failed at Endcap			
6.095	50,704,840	Suspended			
4.755	22,441,780	Suspended			
			Regression Output:		
			Intercept	log(Aamp)	10.058
				log(Arng)	11.267
			Slope		-4.016
			Std Err of Y Est		0.139
			COV		0.274
			R Squared		0.965
			No. of Observations		5
			Degrees of Freedom		3

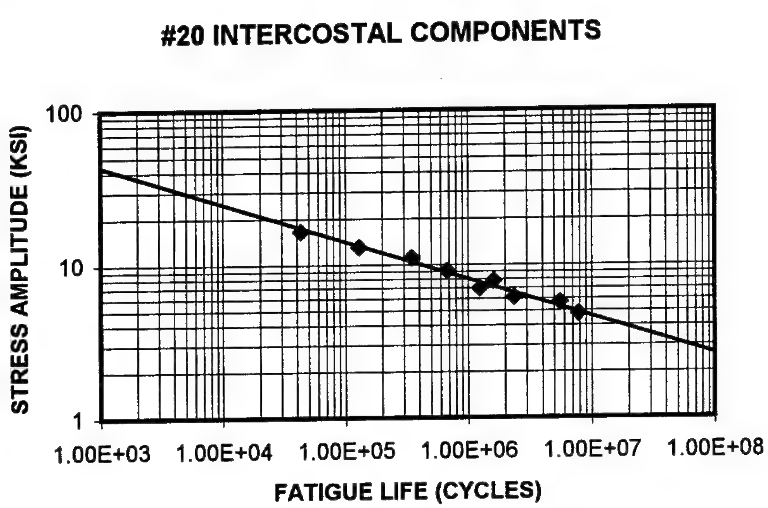

#19 HSLA SNIPED COMPONENT
STRESS AMPLITUDE (KSI)
100
10
1
1.00E+03
1.00E+04
1.00E+05
1.00E+06
1.00E+07
1.00E+08
FATIGUE LIFE (CYCLES)


6"
1/4"
3/16"
35"

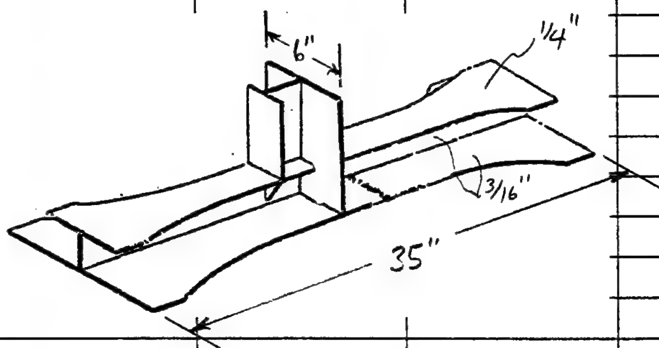
#20 INTERCOSTAL COMPONENTS (APPROX R=0)

Steel Type:	HSLA
Loading:	Axial R=0
Thickness:	N/A
Fabricator:	NSWC
Configuration:	Intercoastal component

Stress Amplitude (KSI)	Fatigue Life (Cycles)
16.6	43,000
13	129,270
11.1	346,100
9.05	676,920
7.8	1,602,640
6.95	1,235,010
6.1	2,353,530
5.65	5,521,190
4.75	7,838,300



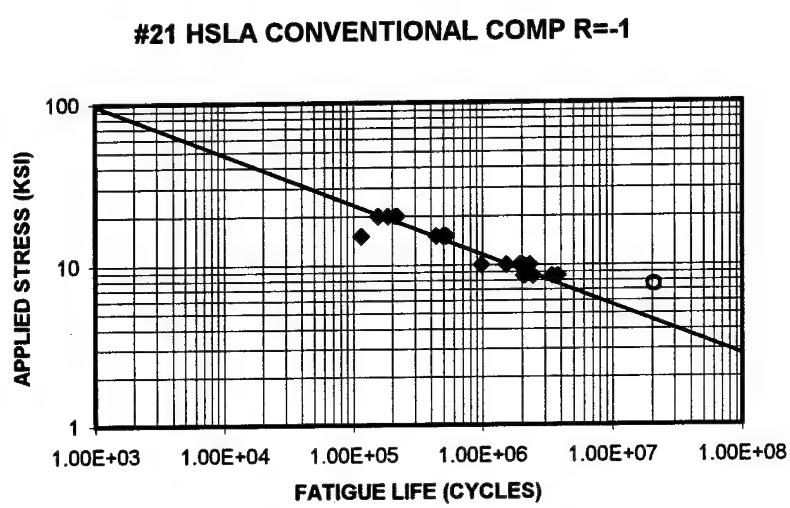
Regression Output:		
Intercept	log(Aamp)	9.699
	log(Arng)	10.930
Slope		-4.088
Std Err of Y Est		0.120
COV		0.242
R Squared		0.977
No. of Observations		9
Degrees of Freedom		7


6"
1/4"
3/16"
35"

#21 HSLA CONVENTIONAL COMPONENTS R=-1

Steel Type:	HSLA
Loading:	Axial R=-1
Thickness:	N/A
Fabricator:	NSWC
Configuration:	Conventional stiffener/bulkhead joint component

Stress Amplitude (KSI)	Fatigue Life (Cycles)
8.5	3,397,800
8.5	2,049,800
8.5	2,422,300
8.5	2,094,000
8.5	3,755,300
10	1,912,300
10	2,026,100
10	975,600
10	2,303,500
10	1,513,000
15	510,800
15	496,000
15	115,200
15	520,900
15	437,400
20	184,000
20	211,300
20	156,900
20	154,400
20	216,200



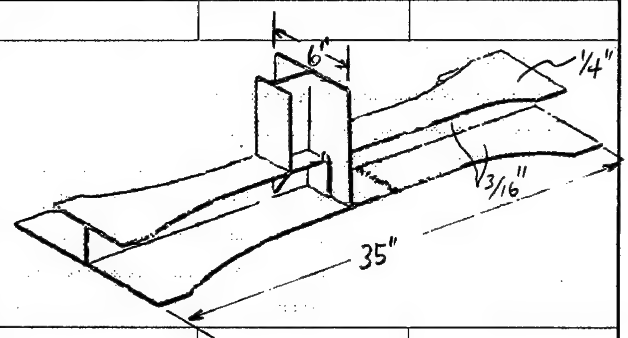
Regression Output:		
Intercept	log(Aamp)	9.427
	log(Arng)	10.399
Slope		-3.230
Std Err of Y Est		0.169
COV		0.323
R Squared		0.896
No. of Observations		20
Degrees of Freedom		18

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
7.5	20,752,200	Suspended

Random Fatigue Data (Narrowband, Zero Mean)

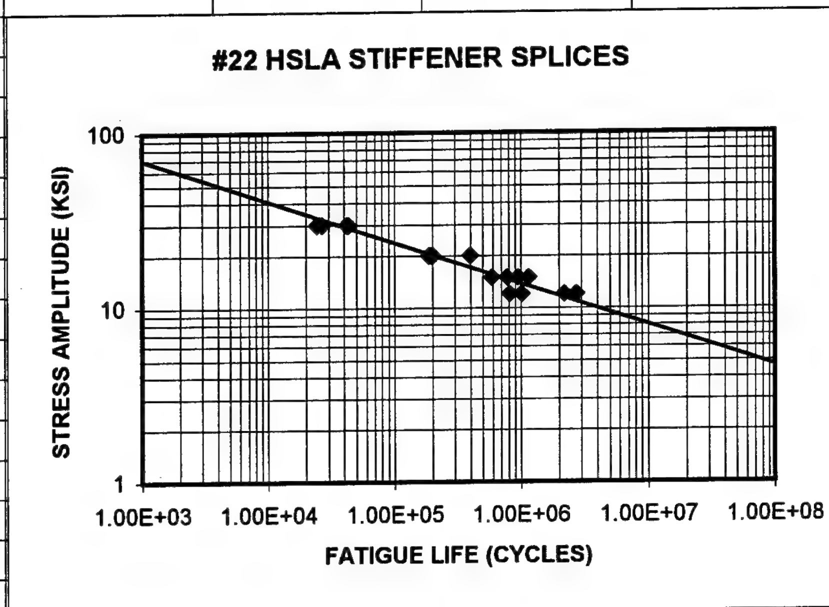
RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	1,812,100	
5	2,363,100	
5	2,497,400	
5	4,343,200	
5	2,297,100	2,544,700
7	1,271,900	
7	807,000	
7	892,300	971,100



#22 HSLA STIFFENER SPLICE R=-1

Steel Type:	HSLA
Loading:	Axial R=-1
Thickness:	N/A
Fabricator:	NSWC
Configuration:	Stiffener Splice

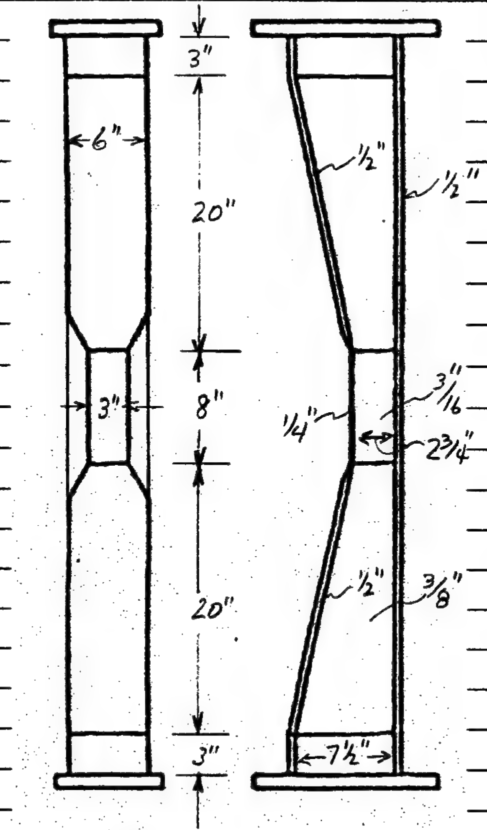
Stress Amplitude (KSI)	Fatigue Life (Cycles)
12	813,200
12	2,193,700
12	2,717,900
12	1,013,000
15	583,500
15	776,200
15	946,300
15	1,151,600
20	396,500
20	187,800
20	196,800
20	199,500
30	41,700
30	43,300
30	24,100
30	26,600



Regression Output:		
Intercept	log(Aamp)	10.843
	log(Arng)	12.122
Slope		-4.250
Std Err of Y Est		0.177
COV		0.335
R Squared		0.936
No. of Observations		16
Degrees of Freedom		14

Random Fatigue Data (Narrowband, Zero Mean)

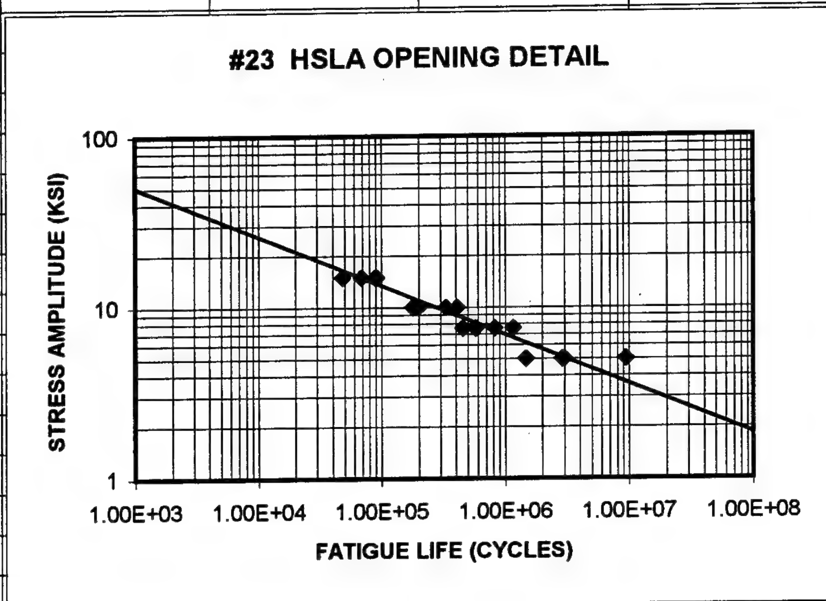
RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
7.5	933,000	
7.5	581,700	
7.5	788,800	
7.5	468,500	669,200
10	168,200	
10	59,200	
10	450,700	
10	292,700	190,400



#23 HSLA OPENING DETAIL R=-1

Steel Type:	HSLA
Loading:	Axial R=-1
Thickness:	N/A
Fabricator:	NSWC
Configuration:	Opening Detail

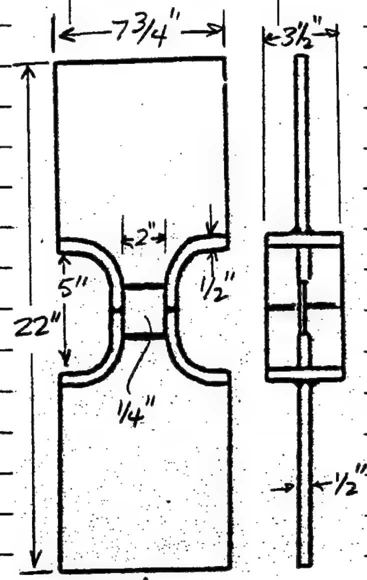
Stress Amplitude (KSI)	Fatigue Life (Cycles)
5	9,357,300
5	1,469,400
5	2,988,900
5	2,860,800
7.5	452,800
7.5	575,500
7.5	818,700
7.5	1,155,400
10	328,000
10	198,700
10	179,200
10	409,900
15	88,400
15	47,900
15	91,200
15	68,400



Regression Output:		
Intercept	log(Aamp)	8.923
	log(Arng)	9.971
Slope		-3.480
Std Err of Y Est		0.203
COV		0.374
R Squared		0.910
No. of Observations		16
Degrees of Freedom		14

Random Fatigue Data (Narrowband, Zero Mean)

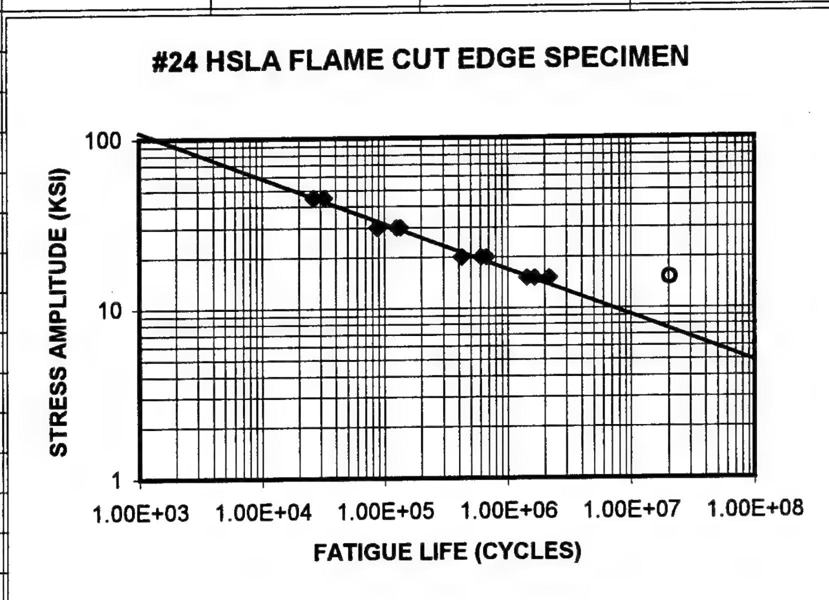
RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	887,000	
5	663,200	
5	708,800	
5	429,100	650,400



#24 HSLA FLAME CUT EDGE SPECIMEN R=-1

Steel Type:	HSLA
Loading:	Axial R=-1
Thickness:	1/2"
Fabricator:	NSWC
Configuration:	Flame Cut Edge

Stress Amplitude (KSI)	Fatigue Life (Cycles)
15	2,171,900
15	1,652,600
15	1,435,800
20	672,400
20	605,800
20	422,800
20	426,000
30	88,200
30	86,600
30	125,400
30	133,600
45	32,300
45	26,700
45	26,100
45	32,300



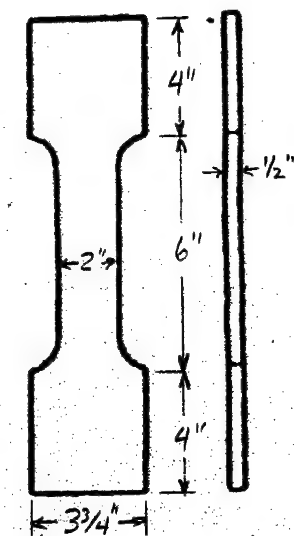
Regression Output:		
Intercept	log(Aamp)	10.553
	log(Arng)	11.668
Slope		-3.705
Std Err of Y Est		0.092
COV		0.191
R Squared		0.983
No. of Observations		15
Degrees of Freedom		13

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
15	20,438,000	Runout

Random Fatigue Data (Narrowband, Zero Mean)

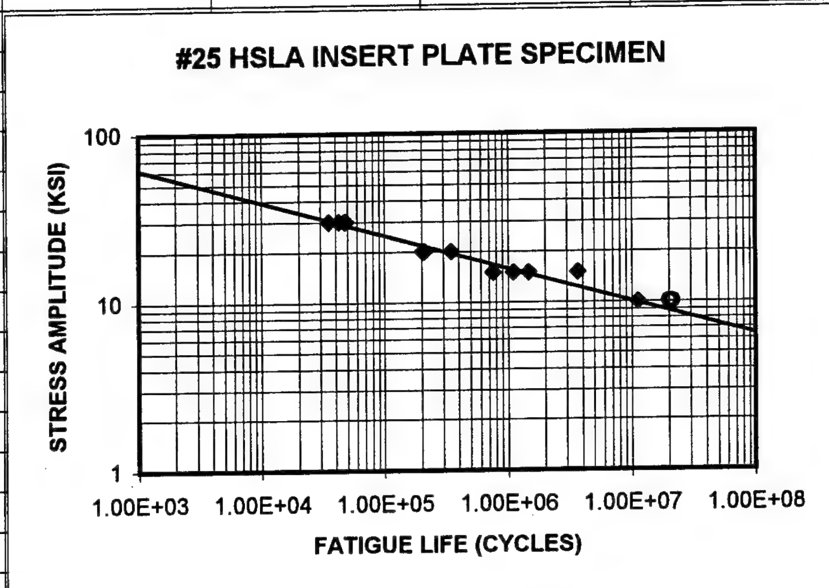
RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
10	760,900	
10	843,100	
10	780,200	
10	741,300	780,500



#25 HSLA INSERT PLATE SPECIMEN R=-1

Steel Type:	HSLA
Loading:	Axial R=-1
Thickness:	1/4" to 1/2"
Fabricator:	NSWC
Configuration:	Insert Plate Specimen

Stress Amplitude (KSI)	Fatigue Life (Cycles)
10	11,112,700
15	3,660,500
15	1,101,700
15	756,500
15	1,466,700
20	203,400
20	345,800
20	208,100
20	210,700
30	47,000
30	48,200
30	42,400
30	34,900



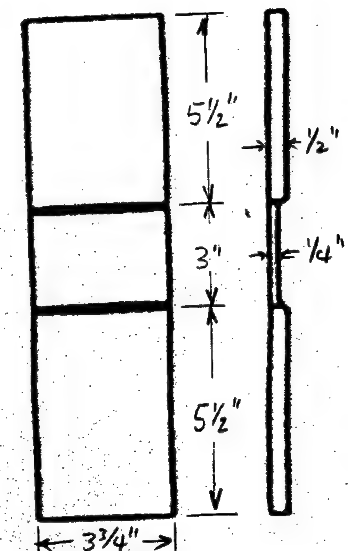
Regression Output:		
Intercept	log(Aamp)	12.101
	log(Arng)	13.633
Slope		-5.090
Std Err of Y Est		0.184
COV		0.345
R Squared		0.951
No. of Observations		13
Degrees of Freedom		11

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
10	20,164,200	Runout
10	20,234,200	Runout
10	21,119,600	Runout

Random Fatigue Data (Narrowband, Zero Mean)

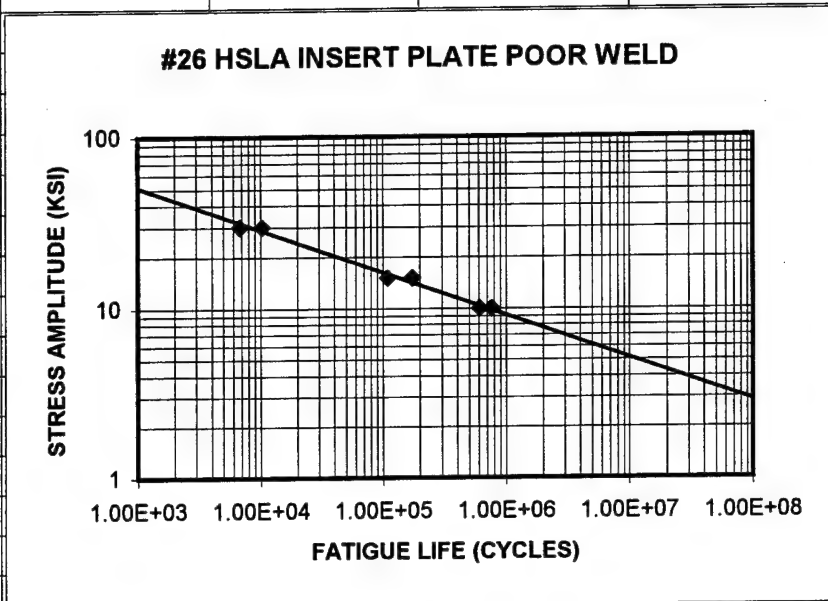
RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
7.5	1,218,200	
7.5	783,200	
7.5	1,410,200	
7.5	2,618,200	1,370,000



#26 HSLA INSERT PLATE POOR WELD SPECIMEN R=-

Steel Type:	HSLA
Loading:	Axial R=-1
Thickness:	1/4" to 1/2"
Fabricator:	NSWC
Configuration:	Insert Plate Poor Weld Specimen

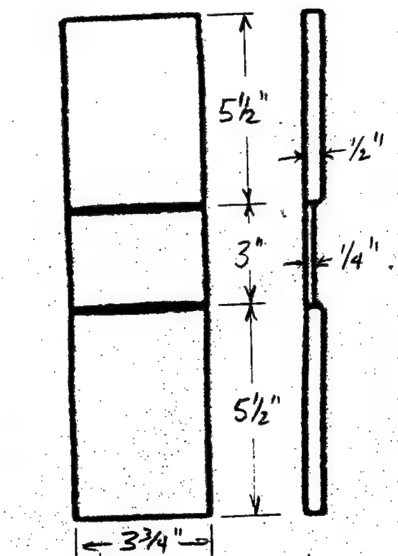
Stress Amplitude (KSI)	Fatigue Life (Cycles)
10	606,300
10	761,000
15	173,400
15	107,800
30	6,770
30	10,260



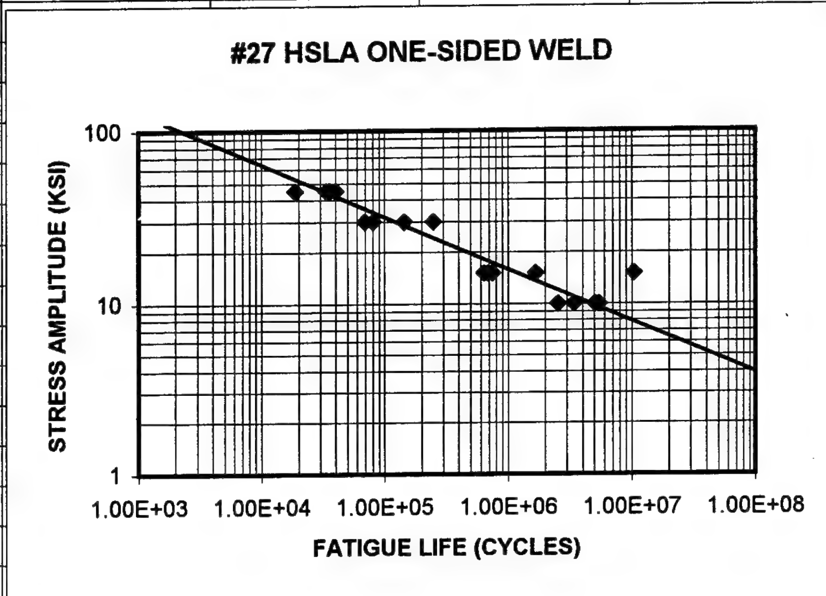
Regression Output:		
Intercept	log(Aamp)	9.845
	log(Arng)	11.051
Slope		-4.009
Std Err of Y Est		0.103
COV		0.211
R Squared		0.989
No. of Observations		6
Degrees of Freedom		4

Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
5	803,100	
5	1,243,200	
5	977,100	
5	1,093,600	1,016,300



		#27 HSLA ONE-SIDED WELD SPECIMEN R=-1			
Steel Type:	HSLA				
Loading:	Axial R=-1				
Thickness:	1/2"				
Fabricator:	NSWC				
Configuration:	One-Sided Weld Specimen (With Backing Bar)				

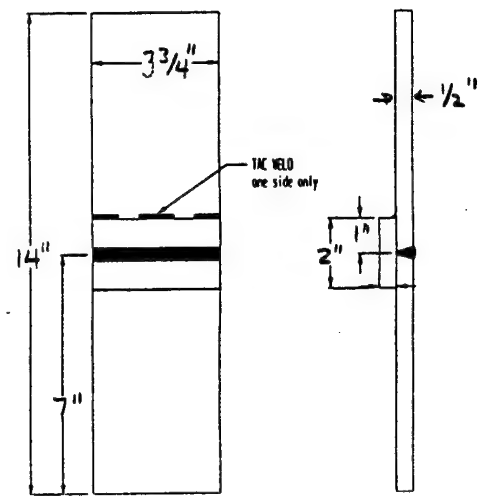


Stress Amplitude (KSI)	Fatigue Life (Cycles)
10	5,379,800
10	2,539,900
10	3,424,500
10	5,027,800
15	751,100
15	639,900
15	1,677,600
15	690,500
15	10,342,600
30	143,100
30	80,200
30	68,600
30	247,000
45	39,800
45	18,800
45	35,500
45	33,400

Regression Output:		
Intercept	log(Aamp)	9.956
	log(Arng)	10.949
Slope		-3.298
Std Err of Y Est		0.307
COV		0.507
R Squared		0.890
No. of Observations		17
Degrees of Freedom		15

Random Fatigue Data (Narrowband, Zero Mean)

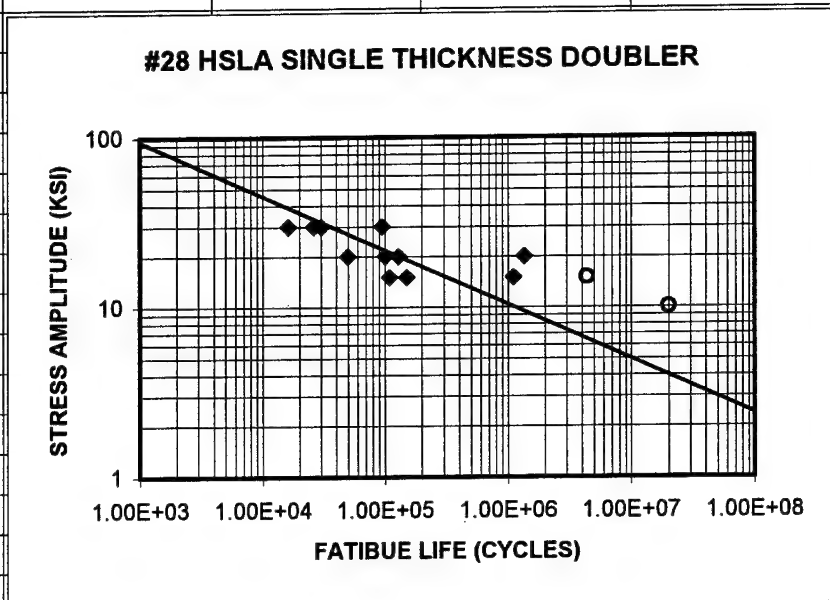
RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
10	633,400	
10	1,548,200	
10	751,000	
10	655,700	833,600



#28 HSLA SINGLE THICKNESS DOUBLER SPEC. R=-1

Steel Type:	HSLA
Loading:	Axial R=-1
Thickness:	1/2"
Fabricator:	NSWC
Configuration:	Single Thickness Doubler Specimen

Stress Amplitude (KSI)	Fatigue Life (Cycles)
15	149,500
15	108,300
15	1,098,200
20	1,346,900
20	128,700
20	49,600
20	99,900
30	94,200
30	26,100
30	16,200
30	30,000



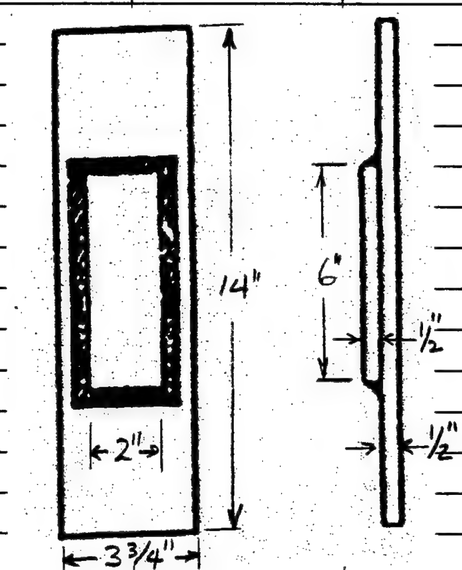
Regression Output:		
Intercept	iog(Aamp)	9.179
	log(Arng)	10.119
Slope		-3.122
Std Err of Y Est		0.490
COV		0.676
R Squared		0.421
No. of Observations		11
Degrees of Freedom		9

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
15	4,394,300	Suspended
10	20,000,000	Suspended
10	20,000,000	Suspended
10	20,000,000	Suspended
10	20,000,000	Suspended

Random Fatigue Data (Narrowband, Zero Mean)

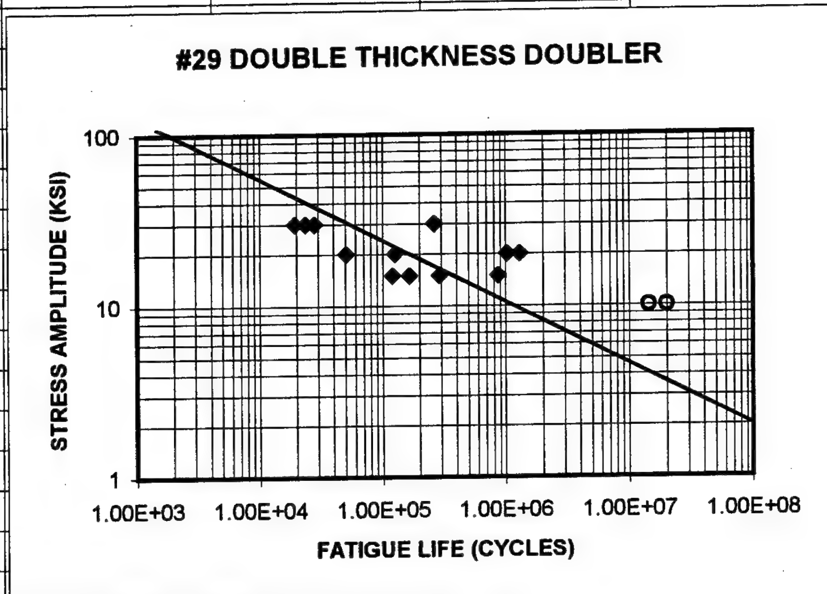
RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
7.5	3,100,200	
7.5	762,600	
7.5	271,700	
7.5	180,200	583,300



#29 HSLA DOUBLE THICKNESS DOUBLER SPEC. R=-1

Steel Type:	HSLA
Loading:	Axial R=-1
Thickness:	1/2"
Fabricator:	NSWC
Configuration:	Double Thickness Doubler Specimen

Stress Amplitude (KSI)	Fatigue Life (Cycles)
15	120,200
15	864,100
15	164,900
15	290,600
20	1,014,400
20	126,100
20	50,700
20	1,294,500
30	19,200
30	23,600
30	263,500
30	27,900



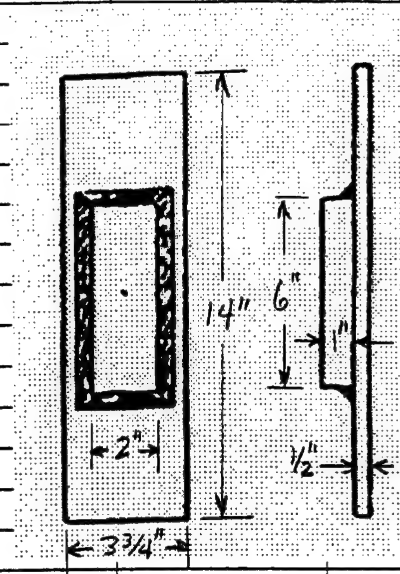
Regression Output:		
Intercept	log(Aamp)	8.843
	log(Arng)	9.680
Slope		-2.780
Std Err of Y Est		0.555
COV		0.722
R Squared		0.314
No. of Observations		12
Degrees of Freedom		10

Constant amplitude data not used

Stress Amplitude (KSI)	Fatigue Life (Cycles)	Comments
10	14485800	Suspended
10	20000000	Suspended
10	20000000	Suspended
10	20000000	Suspended
30	215700	Failed in Grip

Random Fatigue Data (Narrowband, Zero Mean)

RMS Stress (KSI)	Fatigue Life (Cycles)	Geometric Mean (KSI)
7.5	408,100	
7.5	418,100	
7.5	211,700	330,600



Appendix F

Gamma Function Properties and Approximations

Gamma Function Properties and Approximations

Gamma functions occur frequently in the analytical study of fatigue strength and maximum lifetime loads. The gamma function is a complete integral of the form given below.

$$\Gamma(z) = \int_0^\infty t^{z-1} e^{-t}\, dt$$

For integer values of the argument, "z", the gamma function can easily be calculated as follows.

$$\Gamma(z) = (z-1)!$$

In addition, knowing that $\Gamma(1/2)=\sqrt{\pi}$ and the recurrence relationship given below allows one to evaluate the gamma function at intervals halfway between integer values.

$$\Gamma(z+1) = z\Gamma(z) = z(z-1)!$$

The gamma function typically occurs in fatigue or loads analysis where the argument of the gamma function is a function of the slope of the S/N curve, B, or a parameter of a probability distribution, e.g., the slope parameter, β, of the Weibull distribution. Using the expressions above, a problem involving gamma functions can at least be bounded and perhaps even interpolated between integer and half integer argument values to provide a quick solution.

Gamma functions corresponding to the first several integer and half integer argument values are provided for this purpose.

$$
\begin{array}{ll}
\Gamma(1/2) = \sqrt{\pi} & \Gamma(1) = 1 \\
\Gamma(3/2) = 1/2\sqrt{\pi} & \Gamma(2) = 1 \\
\Gamma(5/2) = 3/4\sqrt{\pi} & \Gamma(3) = 2 \\
\Gamma(7/2) = 15/8\sqrt{\pi} & \Gamma(4) = 6 \\
\Gamma(9/2) = 105/16\sqrt{\pi} & \Gamma(5) = 24 \\
\Gamma(11/2) = 945/32\sqrt{\pi} & \Gamma(6) = 120 \\
\Gamma(13/2) = 10395/64\sqrt{\pi} & \Gamma(7) = 720
\end{array}
$$

For problems involving evaluation and accuracy at other intermediate arguments, the best approach is to use readily available computer subroutines (Press, 1992). Aside from that, very accurate polynomial approximations are also available, but only apply directly to arguments between values of one and two. Recurrence relations must be used to evaluate the gamma functions at other values.

If nothing else is available, a rough estimate can be made using the following approximation. A comparison of this approximation with the computer subroutine values is given in Figures F-1 and F-2.

$$
\begin{array}{ll}
0 < z \leq 1 & \Gamma(z) \approx (0.875 + \left|(z-0.5)^3\right|)/z \\
1 < z \leq 2 & \Gamma(z) \approx 0.875 + \left|(z-1.5)^3\right| \\
2 < z < 6 & \Gamma(z) \approx 2.63e^{(1-z)}(z-1)^{(z-1/2)} \\
z \geq 6 & \Gamma(z) \approx (\mathrm{int}\,eger(z-1))!
\end{array}
$$

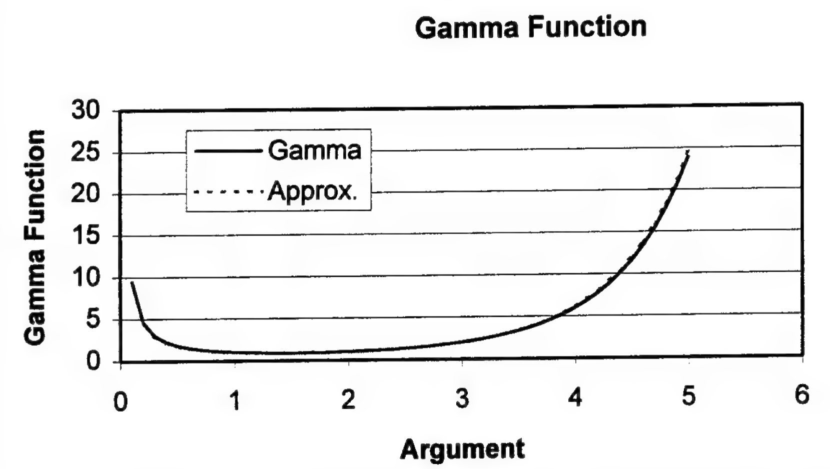


Figure F-1 - Comparison between Gamma Function and Approximation

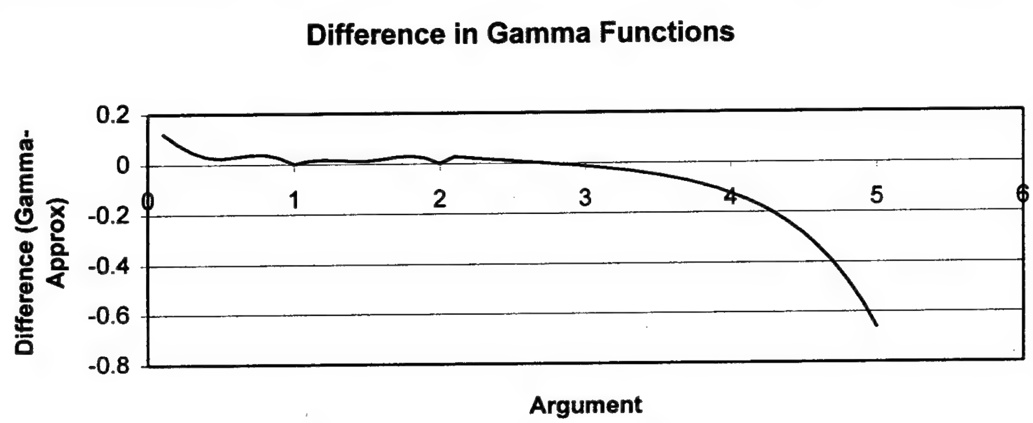


Figure F-2 - Difference between Gamma Function and Approximation

Appendix G

Expected Moments of Useful Probability Distributions

Expected Moments of Useful Probability Distributions

Probability distributions are used to represent the frequency of occurrence of many natural phenomena. Many of these distributions are interrelated. For example, the random process of wave elevation is generally considered to be represented by the Gaussian probability distribution. The extrema, or peaks and valleys, of a Gaussian distribution are represented by the S.O. Rice distribution. The S.O. Rice distribution has two limiting states, depending on the frequency content of the Gaussian random process. In the case of an extremely narrowband Gaussian process, the S.O. Rice distribution degenerates into the Rayleigh probability distribution. In the case of an extremely broadband Gaussian process, the S.O. Rice distribution degenerates into the Gaussian probability distribution.

Ship primary loadings, and therefore stresses, are often represented by the Weibull probability distribution, or one of its special forms; the exponential or Rayleigh distributions. The exponential distribution is sometimes used to represent a lifetime distribution of stress, while the Rayleigh distribution is often used to represent short distributions of stress. Knowing the distribution of stress, allows one to calculate the expected fatigue life of random stresses. The expected cycles to failure is calculated as a function of the parameters of the constant amplitude S/N curve. The fatigue life calculated is determined from the "m"th moment of the stress probability distribution, where "m" is the negative inverse slope of the S/N curve.

Moments of probability distributions are also very useful when simulating time histories or sequences of random numbers which follow a particular distribution. The accuracy of the simulation can be evaluated by comparing the first several moments of the simulated sequence to the theoretical moments.

The following expressions summarize the expected moments of probability distributions of those typically used in fatigue and maximum value calculations.

Gaussian Probability Density Function with zero mean and standard deviation, σ_Y

$$p(Y) = \frac{e^{(\frac{-Y^2}{2\sigma_Y^2})}}{\sqrt{2\pi}\ \sigma_Y} \qquad -\infty < Y < \infty$$

Moment of Gaussian Distribution

$$\begin{aligned} E[Y^j] &= \frac{2^{j/2}}{\sqrt{\pi}} \sigma_Y^j\ \Gamma(\frac{j+1}{2}) \quad && for \quad j \quad even \\ &= 0 && for \quad j \quad odd \end{aligned}$$

First ten moments of Gaussian Distribution

$$\begin{aligned} E[Y^1] &= 0 \\ E[Y^2] &= \sigma_Y^2 \\ E[Y^3] &= 0 \\ E[Y^4] &= 3\sigma_Y^4 \\ E[Y^5] &= 0 \\ E[Y^6] &= 15\sigma_Y^6 \\ E[Y^7] &= 0 \\ E[Y^8] &= 105\sigma_Y^8 \\ E[Y^9] &= 0 \\ E[Y^{10}] &= 945\sigma_Y^{10} \end{aligned}$$

Rayleigh Probability Density Function with parameter C. Sometimes C is specified as the RMS value, σ

$$p(Z) = \frac{Z}{C^2} e^{(\frac{-Z^2}{2C^2})} \qquad 0 < Z < \infty$$

Moments of Rayleigh Distribution

$$E[Z^j] = 2^{j/2} C^j \Gamma(\frac{j}{2} + 1)$$

First ten moments of Rayleigh Distribution

$$E[Z^1] = \sqrt{\pi/2}\,C$$
$$E[Z^2] = 2C^2$$
$$E[Z^3] = 3\sqrt{\pi/2}\,C^3$$
$$E[Z^4] = 8C^4$$
$$E[Z^5] = 15\sqrt{\pi/2}\,C^5$$
$$E[Z^6] = 48C^6$$
$$E[Z^7] = 105\sqrt{\pi/2}\,C^7$$
$$E[Z^8] = 384C^8$$
$$E[Z^9] = 945\sqrt{\pi/2}\,C^9$$
$$E[Z^{10}] = 3840C^{10}$$

Exponential Probability Distribution

$$p(Z) = \frac{1}{\theta} e^{-\frac{Z}{\theta}}$$

Moments of the Exponential Distribution

$$E[Z^n] = \theta^n \Gamma(n+1)$$

First ten moments of the Exponential Distribution

$$E[Z] = \theta$$
$$E[Z^2] = 2\theta^2$$
$$E[Z^3] = 6\theta^3$$
$$E[Z^4] = 24\theta^4$$
$$E[Z^5] = 120\theta^5$$
$$E[Z^6] = 720\theta^6$$
$$E[Z^7] = 5040\theta^7$$
$$E[Z^8] = 40320\theta^8$$
$$E[Z^9] = 362880\theta^9$$
$$E[Z^{10}] = 3628800\theta^{10}$$

S.O. Rice Probability Density Function with parameters σ and α, the RMS value and irregularity factor, respectively.

$$p(P) = \sqrt{\frac{(1-\alpha^2)}{2\pi\sigma_X^2}}e^{\left(\frac{-P^2}{2\sigma_X^2(1-\alpha^2)}\right)} + \frac{\alpha P}{2\sigma_X^2}\left[1+erf\left(\frac{\alpha P}{\sigma_X\sqrt{2-2\alpha^2}}\right)\right]e^{\left(\frac{-P^2}{2\sigma_X^2}\right)} \qquad -\infty < P < \infty$$

Moments of the S.O. Rice Distribution

$$E[P^j] = \frac{j!2^{j/2}}{\sqrt{\pi}}\sigma_X^j\sum_{n=0}^{j}\frac{\Gamma\left(\frac{j-n+1}{2}\right)\Gamma\left(1+\frac{n}{2}\right)(1-\alpha^2)^{\frac{1}{2}(j-n)}\alpha^n\left(\frac{1+(-1)^{(j-n)}}{2}\right)}{(j-n)!n!}$$

First ten moments of the S.O. Rice Distribution

$$E[P^1] = \sqrt{\pi/2}\,(\alpha)\sigma_X$$
$$E[P^2] = (1+\alpha^2)\sigma_X^2$$
$$E[P^3] = \sqrt{\pi/2}\,(3\alpha)\sigma_X^3$$
$$E[P^4] = (3+6\alpha^2-\alpha^4)\sigma_X^4$$
$$E[P^5] = \sqrt{\pi/2}\,(15\alpha)\sigma_X^5$$
$$E[P^6] = 3(5+15\alpha^2-5\alpha^4+\alpha^6)\sigma_X^6$$
$$E[P^7] = \sqrt{\pi/2}\,(105\alpha)\sigma_X^7$$
$$E[P^8] = 3(35+140\alpha^2-70\alpha^4+28\alpha^6-5\alpha^8)\sigma_X^8$$
$$E[P^9] = \sqrt{\pi/2}\,(945\alpha)\sigma_X^9$$
$$E[P^{10}] = 15(63+315\alpha^2-210\alpha^4+126\alpha^6-45\alpha^8+7\alpha^{10})\sigma_X^{10}$$

The two parameter Weibull probability distribution

$$p(x) = \frac{\beta}{\theta}\left(\frac{x}{\theta}\right)^{\beta-1} e^{-\left(\frac{x}{\theta}\right)^{\beta}} \qquad 0 < x < \infty$$

Moments of the two parameter Weibull distribution

$$E(x^n) = \theta^n \Gamma(1 + n/\beta)$$

First ten moments of the two parameter Weibull distribution

$$E[x] = \theta\,\Gamma(1+1/\beta)$$
$$E[x^2] = \theta^2\Gamma(1+2/\beta)$$
$$E[x^3] = \theta^3\Gamma(1+3/\beta)$$
$$E[x^4] = \theta^4\Gamma(1+4/\beta)$$
$$E[x^5] = \theta^5\Gamma(1+5/\beta)$$
$$E[x^6] = \theta^6\Gamma(1+6/\beta)$$
$$E[x^7] = \theta^7\Gamma(1+7/\beta)$$
$$E[x^8] = \theta^8\Gamma(1+8/\beta)$$
$$E[x^9] = \theta^9\Gamma(1+9/\beta)$$
$$E[x^{10}] = \theta^{10}\Gamma(1+10/\beta)$$

The three parameter Weibull distribution

$$p(P) = \left(\frac{\beta}{\theta - X_o}\right)\left(\frac{P - X_o}{\theta - X_o}\right)^{\beta-1} e^{-\left(\frac{P-X_o}{\theta-X_o}\right)^{\beta}}$$

Moments of a three parameter Weibull distribution

$$E[P^n] = (\theta - X_o)^n \Gamma\left(\frac{n}{\beta}+1\right) + n(\theta - X_o)^{n-1}\Gamma\left(\frac{n-1}{\beta}\right)X_o + \frac{n(n-1)}{2!}(\theta - X_o)^{n-2}\Gamma\left(\frac{n-2}{\beta}+1\right)X_o^2$$

$$+\frac{n(n-1)(n-2)}{3!}(\theta - X_o)^{n-3}\Gamma\left(\frac{n-3}{\beta}+1\right)X_o^3 + \cdots\cdots\cdots + n(\theta - X_o)\Gamma\left(\frac{1}{\beta}+1\right)X_o^{n-1} + X_o^n$$

First ten moments of the three parameter Weibull distribution

$$E[P] = (\theta - X_o)\,\Gamma(1/\beta+1) + X_o$$

$$E[P^2] = (\theta - X_o)^2\Gamma(2/\beta+1) + 2(\theta - X_o)\Gamma(1/\beta+1)X_o + X_o^2$$

$$E[P^3] = (\theta - X_o)^3\Gamma(3/\beta+1) + 3(\theta - X_o)^2\Gamma(2/\beta+1)X_o + 3(\theta - X_o)\Gamma(1/\beta+1)X_o^2 + X_o^3$$

$$E[P^4] = (\theta - X_o)^4\Gamma(4/\beta+1) + 4(\theta - X_o)^3\Gamma(3/\beta+1)X_o + 6(\theta - X_o)^2\Gamma(2/\beta+1)X_o^2 + 4(\theta - X_o)\Gamma(1/\beta+1)X_o^3 + X_o^4$$

$$E[P^5] = (\theta - X_o)^5\Gamma(5/\beta+1) + 5(\theta - X_o)^4\Gamma(4/\beta+1)X_o + 10(\theta - X_o)^3\Gamma(3/\beta+1)X_o^2 + 10(\theta - X_o)^2\Gamma(2/\beta+1)X_o^3 + 5(\theta - X_o)\Gamma(1/\beta+1)X_o^4 + X_o^5$$

$$E[P^6] = (\theta - X_o)^6\Gamma(6/\beta+1) + 6(\theta - X_o)^5\Gamma(5/\beta+1)X_o + 15(\theta - X_o)^4\Gamma(4/\beta+1)X_o^2 + 20(\theta - X_o)^3\Gamma(3/\beta+1)X_o^3 + 15(\theta - X_o)^2\Gamma(2/\beta+1)X_o^4 + 6(\theta - X_o)\Gamma(1/\beta+1)X_o^5 + X_o^6$$

$$E[P^7] = (\theta - X_o)^7\Gamma(7/\beta+1) + 7(\theta - X_o)^6\Gamma(6/\beta+1)X_o + 21(\theta - X_o)^5\Gamma(5/\beta+1)X_o^2 + 35(\theta - X_o)^4\Gamma(4/\beta+1)X_o^3 + 35(\theta - X_o)^3\Gamma(3/\beta+1)X_o^4 + 21(\theta - X_o)^2\Gamma(2/\beta+1)X_o^5 + 7(\theta - X\ )\Gamma(1/\beta+1)X_o^6 + X_o^7$$

$$E[P^8] = (\theta - X_o)^8\Gamma(8/\beta+1) + 8(\theta - X_o)^7\Gamma(7/\beta+1)X_o + 28(\theta - X_o)^6\Gamma(6/\beta+1)X_o^2 + 56(\theta - X_o)^5\Gamma(5/\beta+1)X_o^3 + 70(\theta - X_o)^4\Gamma(4/\beta+1)X_o^4 + 56(\theta - X_o)^3\Gamma(3/\beta+1)X_o^5 + 28(\theta - X_o)^2\Gamma(2/\beta+1)X_o^6 + 8(\theta - X_o)\Gamma(1/\beta+1)X_o^7 + X_o^8$$

$$E[P^9] = (\theta - X_o)^9\Gamma(9/\beta+1) + 9(\theta - X_o)^8\Gamma(8/\beta+1)X_o + 36(\theta - X_o)^7\Gamma(7/\beta+1)X_o^2 + 84(\theta - X_o)^6\Gamma(6/\beta+1)X_o^3 + 126(\theta - X_o)^5\Gamma(5/\beta+1)X_o^4 + 126(\theta - X_o)^4\Gamma(4/\beta+1)X_o^5 + 84(\theta - X_o)^3\Gamma(3/\beta+1)X_o^6 + 36(\theta - X_o)^2\Gamma(2/\beta+1)X_o^7 + 9(\theta - X_o)\Gamma(1/\beta+1)X_o^8 + X_o^9$$

$$E[P^{10}] = (\theta - X_o)^{10}\Gamma(10/\beta+1) + 10(\theta - X_o)^9\Gamma(9/\beta+1)X_o + 45(\theta - X_o)^8\Gamma(8/\beta+1)X_o^2 + 120(\theta - X_o)^7\Gamma(7/\beta+1)X_o^3 + 210(\theta - X_o)^6\Gamma(6/\beta+1)X_o^4 + 252(\theta - X_o)^5\Gamma(5/\beta+1)X_o^5 + 210(\theta - X_o)^4\Gamma(4/\beta+1)X_o^6 + 120(\theta - X_o)^3\Gamma(3/\beta+1)X_o^7 + 45(\theta - X_o)^2\Gamma(2/\beta+1)X_o^8 + 10(\theta - X_o)\Gamma(1/\beta+1)X_o^9 + X_o^{10}$$

Appendix H

Histograms of Experimental/Predicted Fatigue Lives

Histograms of Experimental/Predicted Fatigue Lives

Fatigue data are typically generated under constant amplitude loadings and then used with a fatigue damage accumulation model to predict fatigue behavior under service loadings. Service loadings are typically non-constant amplitude. Loadings for ship structure are actually random, but tend to be Rayleigh distributed in many cases. For this reason, the fatigue data generated under this effort were tested under constant amplitude loadings and variable amplitude loadings that were Rayleigh distributed as described in the main text of this report. The Rayleigh Approximation formula therefore offers the best means to predict the variable amplitude loadings based on the S/N curve generated from the constant amplitude fatigue tests. Data used in these analyses can be found in Appendix E.

Histograms were produced from ratios of the experimental fatigue lives divided by predicted fatigue lives. The predicted lives were determined using the Rayleigh Approximation formula. Two separate histograms were generated. The purpose of the first histogram, shown in Figure H-1, is to show how well the experimental data are predicted by the Rayleigh Approximation formula; essentially assessing the accuracy of Miner's Rule. For this case, the predictions are made using the 50% probability of failure (mean) constant amplitude S/N curve. As mentioned previously, only single line S/N curves are used, ignoring any constant amplitude endurance limit effects. Also, for this first case, the experimental data are represented by the geometric mean of the individual data points. Data used to construct the first histogram can be found in Table H-1.

The purpose of the second histogram, shown in Figure H-2, is to show how well a design S/N curve performs in avoiding fatigue failures. The design S/N curve in this case

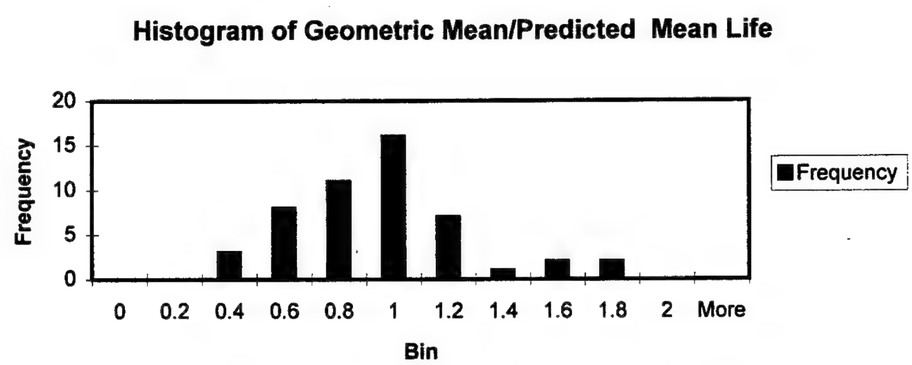
is represented by a mean minus two sigma S/N curve (2.3% probability of failure). For this second case, the predicted fatigue life estimates were made using the Rayleigh Approximation formula with the mean minus two sigma S/N curve. The experimental data were used as is; i.e., individual data points were used instead of representing them by a geometric mean value. Data used to construct the second histogram can be found in Table H-2.

Note that the data from detail set #5 (HSLA Continuous Cruciform Lab + Shipyard 7/16”) was not included in either analysis because they had already been included separately in data sets #3 and #4. The first histogram, with predictions made using the mean S/N curve and experimental lives represented by the geometric mean, shows the most frequently occurring ratio is unity, and the distribution of ratios is somewhat symmetric and centered on this value. This analysis indicates the use of Miner’s Rule in fatigue life prediction generally produces accurate results. Non-conservative results, those located below unity, tend to occur for details which contain imperfections and misalignments or larger components. Conservative estimates, located above unity, tend to occur for better quality and smaller sized specimen configurations.

The second histogram, with predictions made using a mean minus two sigma S/N curve and individual experimental data points, shows that the ratio distribution shifts significantly to the conservative (right) side of unity. This reflects the fact that most of the specimens should not, and do not, fail at their predicted (design) fatigue life. Again, only a few individual specimens, out of over one hundred, are below unity indicating that a few failures would have occurred in service.

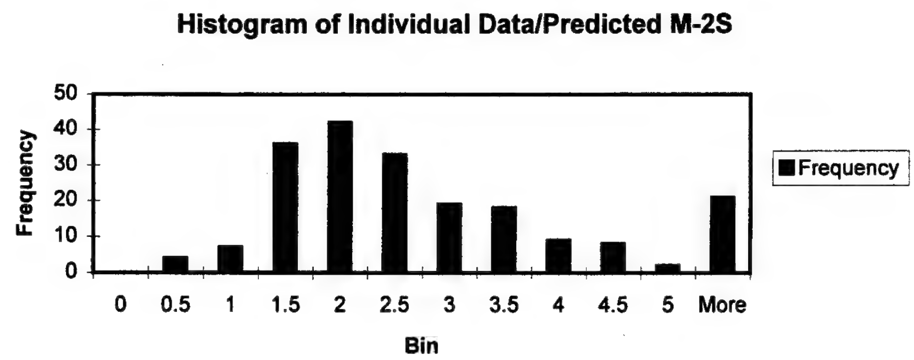
Overall, the methodology for cumulative damage calculations under random loads tends to work well and provides reasonably accurate fatigue life predictions. Further, the use of this methodology for design, using a mean minus two standard deviation S/N curve tends to perform equally as well.

Data Index



Bin	*Frequency*
0	0
0.2	0
0.4	3
0.6	8
0.8	11
1	16
1.2	7
1.4	1
1.6	2
1.8	2
2	0
More	0

Configuration	RMS Stress (ksi)	Act/Pred Mean Ratio	Act/Pred Mean-2S Ratio
#1 HSLA Bending 7/16"	10	0.40	2.25
	15	0.58	3.28
	22.5	0.62	3.53
#2 HSLA 1/4" SYD	5	0.34	1.69
	10	0.98	4.90
	15	0.44	2.22
#3 HSLA Continuous Cruciform	5	0.99	2.33
	7.5	0.97	2.26
	10	1.20	2.80
	15	0.84	1.98
#4 HSLA 7/16" SYD	5	0.63	1.66
	10	0.81	2.14
	15	0.68	1.80
#6 HSLA 3/4" SYD	4	0.86	1.90
	5	0.73	1.62
	10	0.73	1.62
#7 HSLA 1" SYD	4	1.41	1.93
	5	1.02	1.39
	10	1.02	1.39
#8 HSLA Discontinuous Cruciform	5	1.10	3.70
	7.5	1.34	4.50
	10	0.97	3.27
	15	0.97	3.25
#9 HSLA Misaligned Cruciform	5	0.69	1.97
#10 HSLA Partial Penetration Disc. Crucifor	5	1.13	2.14
#11 HSLA Misaligned Partial Penetration Cr	5	0.63	1.63
#12 HS Continuous Cruciform	5	0.57	1.55
	7.5	0.91	2.48
	10	0.96	2.62
#13 HS Discontinuous Cruciform	7.5	1.55	4.95
	10	1.19	3.80
#14 HS Misaligned Cruciform	5	0.23	0.44
#15 OS Continuous Cruciform	5	0.84	2.31
	7.5	0.60	1.65
	10	0.84	2.32
#16 OS Discontinuous Cruciform	7.5	0.91	3.70
	10	0.44	1.80
#17 OS Misaligned Cruciform	5	1.66	3.30
#18 HSLA & HS Conv. Components R=0	5	1.67	4.58
#21 HSLA Conv. Components R=-1	5	0.76	1.66
	7	0.86	1.88
#22 HSLA Stiffener Splice	7.5	0.49	1.12
	10	0.48	1.08
#23 HSLA Opening Detail	5	1.12	2.85
#24 HSLA Flame Cut Edge	10	0.70	1.07
#25 HSLA Insert Plate "Good Weld"	7.5	0.63	1.47
#26 HSLA Insert Plate "Poor Weld"	5	0.74	1.19
#27 HSLA One-Sided Welds	10	0.85	3.51
#28 HSLA Single Thickness Doubler	7.5	0.85	8.16
#29 HSLA Double Thickness Doubler	7.5	0.42	5.36



Bin	*Frequency*
0	0
0.5	4
1	7
1.5	36
2	42
2.5	33
3	19
3.5	18
4	9
4.5	8
5	2
More	21

Configuration	RMS Stress (ksi)	Act/Pred Mean Ratio	Act/Pred Mean-2S Ratio
#1 HSLA Bending 7/16"	10	0.48	2.74
	10	0.81	4.60
	10	0.11	0.63
	10	0.57	3.26
	15	0.40	2.28
	15	1.15	6.56
	15	0.57	3.23
	15	0.42	2.39
	22.5	0.76	4.33
	22.5	0.50	2.87
	22.5	0.98	5.59
	22.5	0.39	2.23
#2 HSLA 1/4" SYD	5	0.31	1.57
	5	0.24	1.21
	5	0.37	1.85
	5	0.47	2.34
	10	0.46	2.32
	10	1.05	5.27
	10	1.08	5.39
	10	1.74	8.71
	15	0.57	2.84
	15	0.37	1.87
	15	0.37	1.87
	15	0.49	2.45
#3 HSLA Continuous Cruciform	5	0.57	1.33
	5	1.16	2.72
	5	1.66	3.89
	5	0.90	2.10
	7.5	1.17	2.74
	7.5	0.86	2.02
	7.5	0.91	2.14
	7.5	0.94	2.21
	10	0.95	2.24
	10	1.34	3.15
	10	1.76	4.13
	10	0.90	2.12
	15	0.67	1.58
	15	0.81	1.90

Configuration	RMS Stress (ksi)	Act/Pred Mean Ratio	Act/Pred Mean-2S Ratio
	15	0.92	2.15
	15	1.01	2.38
#4 HSLA 7/16" SYD	5	0.52	1.37
	5	0.76	2.00
	5	0.67	1.75
	5	0.60	1.57
	10	0.90	2.35
	10	0.53	1.40
	10	0.59	1.56
	10	1.55	4.07
	15	0.84	2.20
	15	0.58	1.51
	15	0.48	1.27
	15	0.93	2.45
#6 HSLA 3/4" SYD	4	0.94	2.07
	4	0.80	1.77
	4	0.67	1.49
	4	1.09	2.41
	5	0.78	1.72
	5	0.70	1.56
	5	0.72	1.60
	5	0.73	1.62
	10	0.73	1.61
	10	0.68	1.50
	10	0.66	1.45
	10	0.88	1.95
#7 HSLA 1" SYD	4	1.58	2.16
	4	1.33	1.82
	4	1.64	2.25
	4	1.13	1.55
	5	1.22	1.67
	5	0.94	1.28
	5	0.86	1.18
	5	1.09	1.49
	10	1.02	1.40
	10	1.00	1.36
	10	1.13	1.55
	10	0.93	1.27

Configuration	RMS Stress (ksi)	Act/Pred Mean Ratio	Act/Pred Mean-2S Ratio
#8 HSLA Discontinuous Cruciform	5	0.62	2.07
	5	0.72	2.43
	5	0.77	2.57
	5	4.32	14.51
	7.5	0.73	2.45
	7.5	1.81	6.09
	7.5	2.36	7.91
	7.5	1.03	3.46
	10	0.42	1.42
	10	2.30	7.72
	10	1.01	3.40
	10	0.91	3.06
	15	0.98	3.31
	15	0.75	2.52
	15	1.28	4.30
	15	0.93	3.11
#9 HSLA Misaligned Cruciform	5	1.34	3.81
	5	0.94	2.67
	5	0.37	1.07
	5	0.49	1.39
#10 HSLA Partial Penetration Disc. Crucifor	5	1.66	3.14
	5	0.73	1.38
	5	1.48	2.81
	5	0.90	1.71
#11 HSLA Misaligned Partial Penetration Cr	5	0.44	1.16
	5	0.50	1.30
	5	0.86	2.24
	5	0.81	2.11
#12 HS Continuous Cruciform	5	0.46	1.24
	5	0.59	1.62
	5	0.37	1.00
	5	1.04	2.83
	7.5	1.11	3.02
	7.5	0.65	1.78
	7.5	1.31	3.57
	7.5	0.72	1.97
	10	0.76	2.08
	10	0.98	2.67

Configuration	RMS Stress (ksi)	Act/Pred Mean Ratio	Act/Pred Mean-2S Ratio
	10	0.85	2.33
	10	1.33	3.63
#13 HS Discontinuous Cruciform	7.5	1.74	5.55
	7.5	0.87	2.77
	7.5	0.95	3.05
	7.5	4.00	12.77
	10	1.63	5.20
	10	0.58	1.84
	10	1.75	5.60
	10	1.22	3.89
#14 HS Misaligned Cruciform	5	0.25	0.48
	5	0.32	0.61
	5	0.15	0.30
	5	0.23	0.45
#15 OS Continuous Cruciform	5	1.47	4.08
	5	0.72	2.00
	5	0.38	1.04
	5	1.22	3.37
	7.5	0.44	1.23
	7.5	0.88	2.44
	7.5	0.61	1.70
	7.5	0.53	1.45
	10	0.86	2.39
	10	1.59	4.40
	10	0.48	1.34
	10	0.75	2.07
#16 OS Discontinuous Cruciform	7.5	1.46	5.94
	7.5	0.42	1.68
	7.5	0.98	3.96
	7.5	1.16	4.71
	10	0.49	1.98
	10	0.26	1.05
	10	0.40	1.61
	10	0.77	3.14
#17 OS Misaligned Cruciform	5	1.97	3.91
	5	1.70	3.37
	5	1.08	2.15
	5	2.12	4.20

Configuration	RMS Stress (ksi)	Act/Pred Mean Ratio	Act/Pred Mean-2S Ratio
#18 HSLA & HS Conv. Components R=0	5	1.83	5.01
	5	1.17	3.22
	5	2.48	6.80
	5	1.46	4.02
#21 HSLA Conv. Components R=-1	5	0.54	1.18
	5	0.71	1.54
	5	0.75	1.63
	5	1.30	2.84
	5	0.69	1.50
	7	1.13	2.46
	7	0.72	1.56
	7	0.79	1.73
#22 HSLA Stiffener Splice	7.5	0.69	1.56
	7.5	0.43	0.97
	7.5	0.58	1.32
	7.5	0.35	0.78
	10	0.42	0.95
	10	0.15	0.34
	10	1.13	2.55
	10	0.73	1.66
#23 HSLA Opening Detail	5	1.53	3.89
	5	1.14	2.91
	5	1.22	3.11
	5	0.74	1.88
#24 HSLA Flame Cut Edge	10	0.68	1.04
	10	0.76	1.16
	10	0.70	1.07
	10	0.67	1.02
#25 HSLA Insert Plate "Good Weld"	7.5	0.56	1.31
	7.5	0.36	0.84
	7.5	0.65	1.51
	7.5	1.20	2.81
#26 HSLA Insert Plate "Poor Weld"	5	0.59	0.94
	5	0.91	1.46
	5	0.71	1.15
	5	0.80	1.28
#27 HSLA One-Sided Welds	10	0.65	2.66
	10	1.58	6.51

Configuration	RMS Stress (ksi)	Act/Pred Mean Ratio	Act/Pred Mean-2S Ratio
	10	0.77	3.16
	10	0.67	2.76
#28 HSLA Single Thickness Doubler	7.5	4.54	43.36
	7.5	1.12	10.67
	7.5	0.40	3.80
	7.5	0.26	2.52
#29 HSLA Double Thickness Doubler	7.5	0.51	6.61
	7.5	0.53	6.78
	7.5	0.27	3.43

Appendix I

Fatigue Strength Ratio Comparisons of S/N Curves

Fatigue Strength Ratio Comparisons of S/N Curves

This appendix serves two purposes. First, it allows one to compare the fatigue strength between any two structural details or design code categories, given the two parameters defining the constant amplitude S/N curve for each detail. Second, it allows one to select alternative details from a ranked list of fatigue strengths. Both purposes consider fatigue strengths in low cycle (10^3) and high cycle (10^8) regimes and at 50% (mean) and 2.3 % (mean minus two standard deviations) probabilities of failure.

The fatigue strength ratios between any to details are determined by substituting the appropriate S/N curve parameters and desired cycle count into the Rayleigh Approximation equation and solving for the root mean squared (rms) stress.

$$\sigma = \left(\frac{10^{\log(A)}}{2^{-B/2}\Gamma(1-B/2)} \right)^{-1/B}$$

This is repeated for the other detail or category of interest; then the ratio of the two strengths is calculated. The baseline, or detail used as the denominator in the rms stress ratio calculation is listed in the first column of each ratio table. The detail or category to compare to the baseline is listed in the first row of each ratio table. To compare the strengths of two details in different tables, intermediate ratios, using the generic S/N curve (contained in each table), must be determined.

Only single line S/N curves are used. Design codes that employ bi-linear S/N curve formulations are considered to be represented only by the first initial linear portion, ignoring the second portion associated with endurance limit effects.

The ratio of fatigue strengths calculated by the Rayleigh Approximation formula is used instead of simply determining the stresses from the S/N curves because many of the details have S/N curve slopes of other than negative three. This being the case, the Rayleigh Approximation formula better reflects the fatigue strength of the details under random (service) loads because the Gamma function is included. When the two details have exactly the same S/N curve slope, the same results would be obtained using the S/N curve directly, or the Rayleigh Approximation formula.

The tables are organized as follows. Fatigue strength ratios associated with the NSWC test results are provided first for 50% probability of failure, and then for 2.3%

probability of failure. Ratios associated with the Ship Structure Committee (SSC) data (Munse, 1982) is next, first for 50% probability of failure and then for 2.3% probability of failure. The Munse SSC document did not report values of standard deviation for a few details #39, #40, #54, #57, #65, and #67. Without the standard deviation, the S/N curve coefficients associated with a 2.3% probability of failure could not be determined. To alleviate this problem, an average standard deviation value of 0.62, calculated from all the other details, was used. Finally, tables associated with the various design codes are presented, first for 50% probability of failure and then for 2.3% probability of failure. The standard deviations for the AASHTO S/N curves were obtained from a National Cooperative Highway Research report (NCHR, 1986).

Data Index

Spec Mean

Test Specimen RMS Fatigue Strength Ratios Associated with a 50% Probability of Failure

	BASELINE CONFIGURATION	LOG(Aamp (ksi)	LOG(Amg (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #1	#2	#3	#4	#5	#6	#7	#8	#9	#10
#1	HSLA 7/16" bending, shipyard	13.617	15.161	-5.130	0.378	10^3 cyc	1	0.7	1.08	0.79	0.93	0.84	0.95	0.96	0.47	0.94
						10^8 cyc	1	0.4	0.28	0.37	0.32	0.2	0.13	0.28	0.24	0.12
#2	HSLA 1/4", continuous cruc., shipyard	10.714	11.944	-4.087	0.350	10^3 cyc	1.42	1	1.53	1.12	1.31	1.19	1.36	1.36	0.66	1.33
						10^8 cyc	2.52	1	0.71	0.94	0.82	0.51	0.34	0.7	0.6	0.31
#3	HSLA 7/16", continuous cruciform	9.559	10.525	-3.210	0.185	10^3 cyc	0.93	0.65	1	0.73	0.86	0.78	0.89	0.89	0.43	0.87
						10^8 cyc	3.55	1.41	1	1.33	1.15	0.72	0.47	0.99	0.85	0.43
#4	HSLA 7/16", continuous cruc., shipyard	10.432	11.592	-3.855	0.210	10^3 cyc	1.27	0.9	1.37	1	1.18	1.07	1.21	1.22	0.59	1.19
						10^8 cyc	2.67	1.06	0.75	1	0.87	0.54	0.36	0.74	0.64	0.32
#5	HSLA 7/16", continuous cruc., lab & syd	9.947	10.999	-3.496	0.205	10^3 cyc	1.08	0.76	1.16	0.85	1	0.91	1.03	1.04	0.5	1.01
						10^8 cyc	3.08	1.22	0.87	1.15	1	0.62	0.41	0.86	0.74	0.37
#6	HSLA 3/4", continuous cruc., shipyard	9.057	10.000	-3.134	0.172	10^3 cyc	1.19	0.84	1.28	0.93	1.1	1	1.14	1.14	0.56	1.11
						10^8 cyc	4.97	1.97	1.4	1.86	1.61	1	0.66	1.38	1.19	0.6
#7	HSLA 1", continuous cruc., shipyard	8.389	9.211	-2.732	0.068	10^3 cyc	1.05	0.74	1.13	0.82	0.97	0.88	1	1.01	0.49	0.98
						10^8 cyc	7.51	2.98	2.12	2.81	2.44	1.51	1	2.09	1.79	0.91
#8	HSLA discontinuous cruciform	9.601	10.597	-3.307	0.263	10^3 cyc	1.04	0.73	1.12	0.82	0.97	0.88	0.99	1	0.49	0.98
						10^8 cyc	3.59	1.43	1.01	1.34	1.16	0.72	0.48	1	0.86	0.44
#9	HSLA misaligned cruciform	9.733	10.922	-3.949	0.227	10^3 cyc	2.14	1.51	2.31	1.68	1.98	1.8	2.04	2.05	1	2.01
						10^8 cyc	4.19	1.66	1.18	1.57	1.36	0.84	0.56	1.17	1	0.51
#10	HSLA non-full penetration disc cruciform	8.272	9.081	-2.686	0.139	10^3 cyc	1.07	0.75	1.15	0.84	0.99	0.9	1.02	1.02	0.5	1
						10^8 cyc	8.22	3.27	2.32	3.08	2.67	1.66	1.09	2.29	1.96	1
#11	HSLA misaligned partial penetration welds	8.513	9.521	-3.349	0.208	10^3 cyc	2.34	1.65	2.52	1.84	2.17	1.97	2.23	2.25	1.09	2.19
						10^8 cyc	7.72	3.07	2.17	2.89	2.5	1.56	1.03	2.15	1.84	0.94
#12	HS continuous cruciform	11.289	12.639	-4.486	0.218	10^3 cyc	1.6	1.13	1.72	1.26	1.48	1.34	1.53	1.53	0.75	1.5
						10^8 cyc	2.21	0.88	0.62	0.83	0.72	0.44	0.29	0.61	0.53	0.27
#13	HS discontinuous cruciform	9.648	10.677	-3.417	0.252	10^3 cyc	1.18	0.83	1.27	0.93	1.09	0.99	1.13	1.13	0.55	1.11
						10^8 cyc	3.64	1.45	1.02	1.36	1.18	0.73	0.48	1.01	0.87	0.44
#14	HS misaligned cruciform	12.902	14.833	-6.416	0.142	10^3 cyc	3.61	2.54	3.89	2.84	3.34	3.04	3.45	3.47	1.69	3.39
						10^8 cyc	2.3	0.92	0.65	0.86	0.75	0.46	0.31	0.64	0.55	0.28
#15	OS continuous cruciform	10.566	11.766	-3.987	0.221	10^3 cyc	1.38	0.97	1.48	1.08	1.27	1.16	1.31	1.32	0.64	1.29
						10^8 cyc	2.62	1.04	0.74	0.98	0.85	0.53	0.35	0.73	0.63	0.32
#16	OS discontinuous cruciform	10.185	11.314	-3.752	0.304	10^3 cyc	1.3	0.92	1.4	1.02	1.2	1.09	1.24	1.25	0.61	1.22
						10^8 cyc	2.97	1.18	0.84	1.11	0.96	0.6	0.39	0.83	0.71	0.36
#17	OS misaligned cruciform	10.541	12.023	-4.924	0.149	10^3 cyc	3.41	2.4	3.67	2.68	3.16	2.87	3.25	3.27	1.59	3.19
						10^8 cyc	3.74	1.49	1.05	1.4	1.21	0.75	0.5	1.04	0.89	0.46
#18	HSLA & HS conventional components	9.192	10.174	-3.263	0.214	10^3 cyc	1.3	0.92	1.4	1.02	1.21	1.1	1.24	1.25	0.61	1.22
						10^8 cyc	4.71	1.87	1.33	1.76	1.53	0.95	0.63	1.31	1.12	0.57
#19	HSLA SNIPED COMP	10.058	11.267	-4.016	0.139	10^3 cyc	1.91	1.34	2.05	1.5	1.76	1.6	1.82	1.83	0.89	1.79
						10^8 cyc	3.55	1.41	1	1.33	1.15	0.72	0.47	0.99	0.85	0.43
#20	HSLA INTERCOASTAL	9.699	10.930	-4.088	0.120	10^3 cyc	2.52	1.77	2.71	1.98	2.33	2.12	2.4	2.42	1.18	2.36
						10^8 cyc	4.46	1.77	1.26	1.67	1.45	0.9	0.59	1.24	1.07	0.54
#21	HSLA CONV CMP R=-1	9.427	10.399	-3.230	0.169	10^3 cyc	1.05	0.74	1.13	0.83	0.97	0.88	1	1.01	0.49	0.98
						10^8 cyc	3.93	1.56	1.11	1.47	1.28	0.79	0.52	1.1	0.94	0.48
#22	HSLA Stiffener Splice	10.843	12.122	-4.250	0.177	10^3 cyc	1.58	1.11	1.71	1.24	1.46	1.33	1.51	1.52	0.74	1.48
						10^8 cyc	2.52	1	0.71	0.94	0.82	0.51	0.34	0.7	0.6	0.31
#23	HSLA Opening Detail	8.923	9.971	-3.480	0.203	10^3 cyc	2.08	1.46	2.24	1.63	1.93	1.75	1.99	2	0.97	1.95
						10^8 cyc	6.03	2.39	1.7	2.26	1.96	1.21	0.8	1.68	1.44	0.73
#24	HSLA Flame cut edge	10.553	11.668	-3.705	0.092	10^3 cyc	0.97	0.69	1.05	0.77	0.9	0.82	0.93	0.94	0.46	0.91
						10^8 cyc	2.31	0.92	0.65	0.86	0.75	0.47	0.31	0.64	0.55	0.28
#25	HSLA Insert Plate "Good Weld"	12.101	13.633	-5.090	0.184	10^3 cyc	1.91	1.34	2.06	1.5	1.77	1.6	1.82	1.83	0.89	1.79
						10^8 cyc	1.94	0.77	0.55	0.73	0.63	0.39	0.26	0.54	0.46	0.24
#26	HSLA Insert Plate "Poor Weld"	9.845	11.051	-4.009	0.103	10^3 cyc	2.14	1.51	2.3	1.68	1.98	1.8	2.04	2.05	1	2
						10^8 cyc	4	1.59	1.13	1.5	1.3	0.81	0.53	1.11	0.96	0.49
#27	HSLA one sided welds	9.956	10.949	-3.298	0.307	10^3 cyc	0.8	0.57	0.87	0.63	0.74	0.68	0.77	0.77	0.38	0.75
						10^8 cyc	2.79	1.11	0.79	1.04	0.91	0.56	0.37	0.78	0.67	0.34
#28	HSLA single thickness doubler welds	9.179	10.119	-3.122	0.490	10^3 cyc	1.07	0.75	1.15	0.84	0.99	0.9	1.02	1.02	0.5	1
						10^8 cyc	4.52	1.8	1.27	1.69	1.47	0.91	0.6	1.26	1.08	0.55
#29	HSLA double thickness doubler welds	8.843	9.680	-2.780	0.555	10^3 cyc	0.78	0.55	0.84	0.61	0.72	0.66	0.75	0.75	0.37	0.73
						10^8 cyc	5.21	2.07	1.47	1.95	1.69	1.05	0.69	1.45	1.24	0.63
#30	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	1.01	0.71	1.09	0.79	0.93	0.85	0.96	0.97	0.47	0.94
						10^8 cyc	4.95	1.97	1.4	1.85	1.61	1	0.66	1.38	1.18	0.6

Spec Mean

	BASELINE CONFIGURATION	LOG(Aamp) (ksi)	LOG(Arng (ksi)	B	STD DEV	RATIO @	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
							RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE)									
#1	HSLA 7/16" bending, shipyard	13.617	15.161	-5.130	0.378	10^3 cyc	0.43	0.63	0.85	0.28	0.73	0.77	0.29	0.77	0.52	0.4
						10^8 cyc	0.13	0.45	0.27	0.43	0.38	0.34	0.27	0.21	0.28	0.22
#2	HSLA 1/4", continuous cruc., shipyard	10.714	11.944	-4.087	0.350	10^3 cyc	0.61	0.89	1.2	0.39	1.03	1.09	0.42	1.09	0.75	0.56
						10^8 cyc	0.33	1.14	0.69	1.09	0.96	0.85	0.67	0.54	0.71	0.56
#3	HSLA 7/16", continuous cruciform	9.559	10.525	-3.210	0.185	10^3 cyc	0.4	0.58	0.79	0.26	0.67	0.71	0.27	0.71	0.49	0.37
						10^8 cyc	0.46	1.61	0.98	1.54	1.35	1.2	0.95	0.75	1	0.8
#4	HSLA 7/16", continuous cruc., shipyard	10.432	11.592	-3.855	0.210	10^3 cyc	0.54	0.8	1.08	0.35	0.92	0.98	0.37	0.98	0.67	0.51
						10^8 cyc	0.35	1.21	0.73	1.16	1.02	0.9	0.71	0.57	0.75	0.6
#5	HSLA 7/16", continuous cruc., lab & syd	9.947	10.999	-3.496	0.205	10^3 cyc	0.46	0.68	0.91	0.3	0.78	0.83	0.32	0.83	0.57	0.43
						10^8 cyc	0.4	1.4	0.85	1.34	1.18	1.04	0.82	0.66	0.87	0.69
#6	HSLA 3/4", continuous cruc., shipyard	9.057	10.000	-3.134	0.172	10^3 cyc	0.51	0.74	1.01	0.33	0.86	0.91	0.35	0.91	0.62	0.47
						10^8 cyc	0.64	2.25	1.36	2.16	1.89	1.67	1.33	1.06	1.4	1.11
#7	HSLA 1", continuous cruc., shipyard	8.389	9.211	-2.732	0.068	10^3 cyc	0.45	0.66	0.89	0.29	0.76	0.81	0.31	0.8	0.55	0.42
						10^8 cyc	0.97	3.4	2.06	3.26	2.87	2.53	2.01	1.6	2.11	1.68
#8	HSLA discontinuous cruciform	9.601	10.597	-3.307	0.263	10^3 cyc	0.45	0.65	0.88	0.29	0.76	0.8	0.31	0.8	0.55	0.41
						10^8 cyc	0.47	1.63	0.99	1.56	1.37	1.21	0.96	0.76	1.01	0.8
#9	HSLA misaligned cruciform	9.733	10.922	-3.949	0.227	10^3 cyc	0.91	1.34	1.81	0.59	1.55	1.65	0.63	1.64	1.12	0.85
						10^8 cyc	0.54	1.9	1.15	1.82	1.6	1.41	1.12	0.89	1.18	0.94
#10	HSLA non-full penetration disc cruciform	8.272	9.081	-2.686	0.139	10^3 cyc	0.46	0.67	0.9	0.3	0.77	0.82	0.31	0.82	0.56	0.42
						10^8 cyc	1.06	3.73	2.26	3.57	3.14	2.77	2.2	1.75	2.32	1.84
#11	HSLA misaligned partial penetration welds	8.513	9.521	-3.349	0.208	10^3 cyc	1	1.46	1.98	0.65	1.7	1.8	0.69	1.8	1.23	0.93
						10^8 cyc	1	3.5	2.12	3.35	2.95	2.6	2.06	1.64	2.17	1.73
#12	HS continuous cruciform	11.289	12.639	-4.486	0.218	10^3 cyc	0.68	1	1.35	0.44	1.16	1.23	0.47	1.23	0.84	0.64
						10^8 cyc	0.29	1	0.61	0.96	0.84	0.74	0.59	0.47	0.62	0.49
#13	HS discontinuous cruciform	9.648	10.677	-3.417	0.252	10^3 cyc	0.5	0.74	1	0.33	0.86	0.91	0.35	0.91	0.62	0.47
						10^8 cyc	0.47	1.65	1	1.58	1.39	1.23	0.97	0.77	1.02	0.82
#14	HS misaligned cruciform	12.902	14.833	-6.416	0.142	10^3 cyc	1.54	2.26	3.06	1	2.62	2.78	1.06	2.77	1.9	1.43
						10^8 cyc	0.3	1.04	0.63	1	0.88	0.78	0.62	0.49	0.65	0.52
#15	OS continuous cruciform	10.566	11.766	-3.987	0.221	10^3 cyc	0.59	0.86	1.17	0.38	1	1.06	0.4	1.06	0.72	0.55
						10^8 cyc	0.34	1.19	0.72	1.14	1	0.88	0.7	0.56	0.74	0.59
#16	OS discontinuous cruciform	10.185	11.314	-3.752	0.304	10^3 cyc	0.56	0.81	1.1	0.36	0.94	1	0.38	1	0.68	0.52
						10^8 cyc	0.38	1.34	0.81	1.29	1.13	1	0.79	0.63	0.83	0.66
#17	OS misaligned cruciform	10.541	12.023	-4.924	0.149	10^3 cyc	1.46	2.13	2.89	0.94	2.48	2.62	1	2.62	1.79	1.35
						10^8 cyc	0.48	1.7	1.03	1.63	1.43	1.26	1	0.8	1.05	0.84
#18	HSLA & HS conventional components	9.192	10.174	-3.263	0.214	10^3 cyc	0.56	0.81	1.1	0.36	0.95	1	0.38	1	0.68	0.52
						10^8 cyc	0.61	2.13	1.29	2.04	1.8	1.59	1.26	1	1.32	1.05
#19	HSLA SNIPED COMP	10.058	11.267	-4.016	0.139	10^3 cyc	0.81	1.19	1.61	0.53	1.38	1.47	0.56	1.46	1	0.76
						10^8 cyc	0.46	1.61	0.98	1.54	1.36	1.2	0.95	0.75	1	0.8
#20	HSLA INTERCOASTAL	9.699	10.930	-4.088	0.120	10^3 cyc	1.08	1.57	2.13	0.7	1.83	1.94	0.74	1.93	1.32	1
						10^8 cyc	0.58	2.02	1.23	1.94	1.7	1.5	1.19	0.95	1.26	1
#21	HSLA CONV CMP R=-1	9.427	10.399	-3.230	0.169	10^3 cyc	0.45	0.66	0.89	0.29	0.76	0.81	0.31	0.81	0.55	0.42
						10^8 cyc	0.51	1.78	1.08	1.71	1.5	1.33	1.05	0.84	1.11	0.88
#22	HSLA Stiffener Splice	10.843	12.122	-4.250	0.177	10^3 cyc	0.68	0.99	1.34	0.44	1.15	1.22	0.46	1.21	0.83	0.63
						10^8 cyc	0.33	1.14	0.69	1.09	0.96	0.85	0.67	0.54	0.71	0.56
#23	HSLA Opening Detail	8.923	9.971	-3.480	0.203	10^3 cyc	0.89	1.3	1.76	0.58	1.51	1.6	0.61	1.6	1.09	0.83
						10^8 cyc	0.78	2.73	1.66	2.62	2.3	2.03	1.61	1.28	1.7	1.35
#24	HSLA Flame cut edge	10.553	11.668	-3.705	0.092	10^3 cyc	0.42	0.61	0.83	0.27	0.71	0.75	0.29	0.75	0.51	0.39
						10^8 cyc	0.3	1.05	0.64	1	0.88	0.78	0.62	0.49	0.65	0.52
#25	HSLA Insert Plate "Good Weld"	12.101	13.633	-5.090	0.184	10^3 cyc	0.81	1.19	1.61	0.53	1.39	1.47	0.56	1.46	1	0.76
						10^8 cyc	0.25	0.88	0.53	0.84	0.74	0.65	0.52	0.41	0.55	0.44
#26	HSLA Insert Plate "Poor Weld"	9.845	11.051	-4.009	0.103	10^3 cyc	0.91	1.34	1.81	0.59	1.55	1.64	0.63	1.64	1.12	0.85
						10^8 cyc	0.52	1.81	1.1	1.74	1.53	1.35	1.07	0.85	1.13	0.9
#27	HSLA one sided welds	9.956	10.949	-3.298	0.307	10^3 cyc	0.34	0.5	0.68	0.22	0.58	0.62	0.24	0.62	0.42	0.32
						10^8 cyc	0.36	1.27	0.77	1.21	1.07	0.94	0.75	0.59	0.79	0.63
#28	HSLA single thickness doubler welds	9.179	10.119	-3.122	0.490	10^3 cyc	0.46	0.67	0.9	0.3	0.78	0.82	0.31	0.82	0.56	0.42
						10^8 cyc	0.59	2.05	1.24	1.96	1.73	1.52	1.21	0.96	1.27	1.01
#29	HSLA double thickness doubler welds	8.843	9.680	-2.780	0.555	10^3 cyc	0.33	0.49	0.66	0.22	0.57	0.6	0.23	0.6	0.41	0.31
						10^8 cyc	0.67	2.36	1.43	2.26	1.99	1.76	1.39	1.11	1.47	1.17
#30	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	0.43	0.63	0.85	0.28	0.73	0.77	0.3	0.77	0.53	0.4
						10^8 cyc	0.64	2.24	1.36	2.15	1.89	1.67	1.32	1.05	1.39	1.11

Spec Mean

	BASELINE CONFIGURATION	LOG(Aamp) (ksi)	LOG(Amg (ksi)	B	STD DEV	RATIO @	#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
							RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE)									
#1	HSLA 7/16" bending, shipyard	13.617	15.161	-5.130	0.378	10^3 cyc	0.95	0.63	0.48	1.03	0.52	0.47	1.25	0.94	1.28	0.99
						10^8 cyc	0.25	0.4	0.17	0.43	0.52	0.25	0.36	0.22	0.19	0.2
#2	HSLA 1/4", continuous cruc., shipyard	10.714	11.944	-4.087	0.350	10^3 cyc	1.35	0.9	0.68	1.46	0.74	0.66	1.77	1.33	1.82	1.41
						10^8 cyc	0.64	1	0.42	1.09	1.3	0.63	0.9	0.56	0.48	0.51
#3	HSLA 7/16", continuous cruciform	9.559	10.525	-3.210	0.185	10^3 cyc	0.88	0.59	0.45	0.95	0.49	0.43	1.16	0.87	1.19	0.92
						10^8 cyc	0.9	1.41	0.59	1.54	1.83	0.89	1.27	0.79	0.68	0.72
#4	HSLA 7/16", continuous cruc., shipyard	10.432	11.592	-3.855	0.210	10^3 cyc	1.21	0.8	0.61	1.3	0.67	0.6	1.58	1.19	1.63	1.26
						10^8 cyc	0.68	1.06	0.44	1.16	1.38	0.67	0.96	0.59	0.51	0.54
#5	HSLA 7/16", continuous cruc., lab & syd	9.947	10.999	-3.496	0.205	10^3 cyc	1.03	0.68	0.52	1.11	0.57	0.51	1.35	1.01	1.38	1.07
						10^8 cyc	0.78	1.22	0.51	1.33	1.59	0.77	1.1	0.68	0.59	0.62
#6	HSLA 3/4", continuous cruc., shipyard	9.057	10.000	-3.134	0.172	10^3 cyc	1.13	0.75	0.57	1.22	0.62	0.56	1.48	1.11	1.52	1.18
						10^8 cyc	1.26	1.97	0.82	2.15	2.56	1.24	1.78	1.1	0.95	1
#7	HSLA 1", continuous cruc., shipyard	8.389	9.211	-2.732	0.068	10^3 cyc	1	0.66	0.5	1.07	0.55	0.49	1.31	0.98	1.34	1.04
						10^8 cyc	1.91	2.98	1.25	3.25	3.87	1.88	2.69	1.66	1.44	1.52
#8	HSLA discontinuous cruciform	9.601	10.597	-3.307	0.263	10^3 cyc	0.99	0.66	0.5	1.07	0.55	0.49	1.3	0.98	1.33	1.04
						10^8 cyc	0.91	1.43	0.6	1.55	1.85	0.9	1.29	0.79	0.69	0.72
#9	HSLA misaligned cruciform	9.733	10.922	-3.949	0.227	10^3 cyc	2.04	1.35	1.03	2.2	1.12	1	2.67	2.01	2.74	2.13
						10^8 cyc	1.06	1.66	0.69	1.81	2.16	1.05	1.5	0.93	0.8	0.85
#10	HSLA non-full penetration disc cruciform	8.272	9.081	-2.686	0.139	10^3 cyc	1.02	0.67	0.51	1.09	0.56	0.5	1.33	1	1.37	1.06
						10^8 cyc	2.09	3.27	1.36	3.56	4.24	2.05	2.94	1.82	1.58	1.66
#11	HSLA misaligned partial penetration welds	8.513	9.521	-3.349	0.208	10^3 cyc	2.23	1.48	1.13	2.4	1.23	1.1	2.92	2.19	3	2.32
						10^8 cyc	1.96	3.07	1.28	3.34	3.98	1.93	2.76	1.71	1.48	1.56
#12	HS continuous cruciform	11.289	12.639	-4.486	0.218	10^3 cyc	1.52	1.01	0.77	1.64	0.84	0.75	1.99	1.5	2.05	1.59
						10^8 cyc	0.56	0.88	0.37	0.95	1.14	0.55	0.79	0.49	0.42	0.45
#13	HS discontinuous cruciform	9.648	10.677	-3.417	0.252	10^3 cyc	1.12	0.75	0.57	1.21	0.62	0.55	1.47	1.11	1.51	1.17
						10^8 cyc	0.92	1.44	0.6	1.57	1.87	0.91	1.3	0.8	0.7	0.73
#14	HS misaligned cruciform	12.902	14.833	-6.416	0.142	10^3 cyc	3.44	2.28	1.74	3.71	1.89	1.69	4.5	3.38	4.62	3.59
						10^8 cyc	0.59	0.91	0.38	1	1.19	0.58	0.82	0.51	0.44	0.47
#15	OS continuous cruciform	10.566	11.766	-3.987	0.221	10^3 cyc	1.31	0.87	0.66	1.41	0.72	0.64	1.72	1.29	1.76	1.37
						10^8 cyc	0.67	1.04	0.43	1.13	1.35	0.65	0.94	0.58	0.5	0.53
#16	OS discontinuous cruciform	10.185	11.314	-3.752	0.304	10^3 cyc	1.24	0.82	0.63	1.33	0.68	0.61	1.62	1.22	1.66	1.29
						10^8 cyc	0.75	1.18	0.49	1.28	1.53	0.74	1.06	0.66	0.57	0.6
#17	OS misaligned cruciform	10.541	12.023	-4.924	0.149	10^3 cyc	3.24	2.15	1.64	3.5	1.79	1.59	4.25	3.19	4.36	3.38
						10^8 cyc	0.95	1.49	0.62	1.62	1.93	0.94	1.34	0.83	0.72	0.76
#18	HSLA & HS conventional components	9.192	10.174	-3.263	0.214	10^3 cyc	1.24	0.82	0.63	1.34	0.68	0.61	1.62	1.22	1.67	1.29
						10^8 cyc	1.2	1.87	0.78	2.04	2.42	1.18	1.68	1.04	0.9	0.95
#19	HSLA SNIPED COMP	10.058	11.267	-4.016	0.139	10^3 cyc	1.81	1.2	0.92	1.95	1	0.89	2.37	1.79	2.44	1.89
						10^8 cyc	0.9	1.41	0.59	1.54	1.83	0.89	1.27	0.79	0.68	0.72
#20	HSLA INTERCOASTAL	9.699	10.930	-4.088	0.120	10^3 cyc	2.4	1.59	1.21	2.58	1.32	1.18	3.14	2.36	3.22	2.5
						10^8 cyc	1.13	1.77	0.74	1.93	2.3	1.11	1.6	0.99	0.86	0.9
#21	HSLA CONV CMP R=-1	9.427	10.399	-3.230	0.169	10^3 cyc	1	0.66	0.51	1.08	0.55	0.49	1.31	0.99	1.35	1.04
						10^8 cyc	1	1.56	0.65	1.7	2.03	0.98	1.41	0.87	0.76	0.79
#22	HSLA Stiffener Splice	10.843	12.122	-4.250	0.177	10^3 cyc	1.51	1	0.76	1.62	0.83	0.74	1.97	1.48	2.03	1.57
						10^8 cyc	0.64	1	0.42	1.09	1.3	0.63	0.9	0.56	0.48	0.51
#23	HSLA Opening Detail	8.923	9.971	-3.480	0.203	10^3 cyc	1.98	1.31	1	2.13	1.09	0.97	2.59	1.95	2.66	2.07
						10^8 cyc	1.53	2.39	1	2.61	3.1	1.51	2.16	1.33	1.16	1.22
#24	HSLA Flame cut edge	10.553	11.668	-3.705	0.092	10^3 cyc	0.93	0.62	0.47	1	0.51	0.46	1.21	0.91	1.25	0.97
						10^8 cyc	0.59	0.92	0.38	1	1.19	0.58	0.83	0.51	0.44	0.47
#25	HSLA Insert Plate "Good Weld"	12.101	13.633	-5.090	0.184	10^3 cyc	1.82	1.21	0.92	1.96	1	0.89	2.38	1.79	2.44	1.89
						10^8 cyc	0.49	0.77	0.32	0.84	1	0.48	0.7	0.43	0.37	0.39
#26	HSLA Insert Plate "Poor Weld"	9.845	11.051	-4.009	0.103	10^3 cyc	2.03	1.35	1.03	2.19	1.12	1	2.66	2	2.74	2.12
						10^8 cyc	1.02	1.59	0.66	1.73	2.06	1	1.43	0.89	0.77	0.81
#27	HSLA one sided welds	9.956	10.949	-3.298	0.307	10^3 cyc	0.76	0.51	0.39	0.82	0.42	0.38	1	0.75	1.03	0.8
						10^8 cyc	0.71	1.11	0.46	1.21	1.44	0.7	1	0.62	0.54	0.56
#28	HSLA single thickness doubler welds	9.179	10.119	-3.122	0.490	10^3 cyc	1.02	0.67	0.51	1.09	0.56	0.5	1.33	1	1.37	1.06
						10^8 cyc	1.15	1.8	0.75	1.96	2.33	1.13	1.62	1	0.87	0.91
#29	HSLA double thickness doubler welds	8.843	9.680	-2.780	0.555	10^3 cyc	0.74	0.49	0.38	0.8	0.41	0.37	0.97	0.73	1	0.78
						10^8 cyc	1.32	2.07	0.86	2.25	2.68	1.3	1.87	1.15	1	1.05
#30	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	0.96	0.64	0.48	1.03	0.53	0.47	1.25	0.94	1.29	1
						10^8 cyc	1.26	1.97	0.82	2.14	2.55	1.24	1.77	1.1	0.95	1

Test Specimen RMS Fatigue Strength Ratios Associated with a 2.3% Probability of Failure

	BASELINE CONFIGURATION	LOG(Aamp (ksi)	LOG(Amg (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #1	#2	#3	#4	#5	#6	#7	#8	#9	#10
#1	HSLA 7/16" bending, shipyard	12.861	14.405	-5.130	0.378	10^3 cyc	1	0.67	1.16	0.86	0.99	0.92	1.19	0.93	0.5	1.04
						10^8 cyc	1	0.38	0.3	0.41	0.35	0.22	0.17	0.27	0.26	0.13
#2	HSLA 1/4", continuous cruc., shipyard	10.014	11.244	-4.087	0.350	10^3 cyc	1.5	1	1.74	1.29	1.49	1.38	1.79	1.4	0.76	1.56
						10^8 cyc	2.66	1	0.81	1.09	0.92	0.58	0.44	0.72	0.68	0.36
#3	HSLA 7/16", continuous cruciform	9.189	10.155	-3.210	0.185	10^3 cyc	0.86	0.57	1	0.74	0.85	0.79	1.03	0.8	0.43	0.89
						10^8 cyc	3.3	1.24	1	1.35	1.15	0.72	0.55	0.89	0.85	0.44
#4	HSLA 7/16", continuous cruc., shipyard	10.012	11.172	-3.855	0.210	10^3 cyc	1.16	0.78	1.35	1	1.16	1.07	1.39	1.09	0.59	1.21
						10^8 cyc	2.45	0.92	0.74	1	0.85	0.54	0.41	0.66	0.63	0.33
#5	HSLA 7/16", continuous cruc., lab & syd	9.537	10.589	-3.496	0.205	10^3 cyc	1.01	0.67	1.17	0.87	1	0.92	1.2	0.94	0.51	1.04
						10^8 cyc	2.88	1.08	0.87	1.18	1	0.63	0.48	0.78	0.74	0.39
#6	HSLA 3/4", continuous cruc., shipyard	8.713	9.656	-3.134	0.172	10^3 cyc	1.09	0.73	1.27	0.94	1.08	1	1.3	1.02	0.55	1.13
						10^8 cyc	4.55	1.71	1.38	1.86	1.58	1	0.76	1.23	1.17	0.61
#7	HSLA 1", continuous cruc., shipyard	8.253	9.075	-2.732	0.068	10^3 cyc	0.84	0.56	0.97	0.72	0.83	0.77	1	0.78	0.42	0.87
						10^8 cyc	6	2.26	1.82	2.45	2.09	1.32	1	1.63	1.54	0.81
#8	HSLA discontinuous cruciform	9.075	10.071	-3.307	0.263	10^3 cyc	1.07	0.71	1.24	0.92	1.06	0.98	1.28	1	0.54	1.11
						10^8 cyc	3.69	1.39	1.12	1.51	1.28	0.81	0.61	1	0.95	0.5
#9	HSLA misaligned cruciform	9.279	10.468	-3.949	0.227	10^3 cyc	1.99	1.32	2.31	1.71	1.97	1.82	2.37	1.86	1	2.06
						10^8 cyc	3.89	1.46	1.18	1.59	1.35	0.85	0.65	1.05	1	0.52
#10	HSLA non-full penetration disc cruciform	7.994	8.803	-2.686	0.139	10^3 cyc	0.96	0.64	1.12	0.83	0.96	0.88	1.15	0.9	0.49	1
						10^8 cyc	7.43	2.79	2.25	3.04	2.58	1.63	1.24	2.01	1.91	1
#11	HSLA misaligned partial penetration welds	8.097	9.105	-3.349	0.208	10^3 cyc	2.22	1.48	2.58	1.91	2.2	2.04	2.65	2.07	1.12	2.3
						10^8 cyc	7.32	2.75	2.22	2.99	2.54	1.61	1.22	1.98	1.88	0.98
#12	HS continuous cruciform	10.853	12.203	-4.486	0.218	10^3 cyc	1.42	0.95	1.65	1.22	1.41	1.31	1.7	1.33	0.72	1.48
						10^8 cyc	1.97	0.74	0.6	0.8	0.68	0.43	0.33	0.53	0.51	0.26
#13	HS discontinuous cruciform	9.144	10.173	-3.417	0.252	10^3 cyc	1.18	0.79	1.37	1.01	1.17	1.08	1.41	1.1	0.59	1.23
						10^8 cyc	3.64	1.37	1.1	1.49	1.27	0.8	0.61	0.99	0.94	0.49
#14	HS misaligned cruciform	12.618	14.549	-6.416	0.142	10^3 cyc	2.85	1.9	3.31	2.45	2.83	2.61	3.4	2.66	1.43	2.95
						10^8 cyc	1.82	0.68	0.55	0.74	0.63	0.4	0.3	0.49	0.47	0.24
#15	OS continuous cruciform	10.124	11.324	-3.987	0.221	10^3 cyc	1.27	0.84	1.47	1.09	1.26	1.16	1.51	1.18	0.64	1.31
						10^8 cyc	2.41	0.91	0.73	0.98	0.84	0.53	0.4	0.65	0.62	0.32
#16	OS discontinuous cruciform	9.577	10.706	-3.752	0.304	10^3 cyc	1.35	0.9	1.56	1.16	1.33	1.23	1.61	1.26	0.68	1.39
						10^8 cyc	3.07	1.15	0.93	1.25	1.07	0.67	0.51	0.83	0.79	0.41
#17	OS misaligned cruciform	10.243	11.725	-4.924	0.149	10^3 cyc	2.79	1.86	3.24	2.4	2.77	2.56	3.33	2.61	1.4	2.89
						10^8 cyc	3.07	1.15	0.93	1.25	1.07	0.67	0.51	0.83	0.79	0.41
#18	HSLA & HS conventional components	8.764	9.746	-3.263	0.214	10^3 cyc	1.26	0.84	1.46	1.08	1.25	1.15	1.5	1.17	0.63	1.3
						10^8 cyc	4.53	1.7	1.37	1.85	1.58	1	0.76	1.23	1.17	0.61
#19	HSLA SNIPED COMP	9.780	10.989	-4.016	0.139	10^3 cyc	1.59	1.06	1.85	1.37	1.58	1.46	1.9	1.49	0.8	1.65
						10^8 cyc	2.97	1.12	0.9	1.21	1.03	0.65	0.49	0.8	0.76	0.4
#20	HSLA INTERCOASTAL	9.459	10.690	-4.088	0.120	10^3 cyc	2.05	1.37	2.38	1.76	2.04	1.88	2.45	1.92	1.03	2.13
						10^8 cyc	3.64	1.37	1.1	1.49	1.26	0.8	0.61	0.99	0.94	0.49
#21	HSLA CONV CMP R=-1	9.089	10.061	-3.230	0.169	10^3 cyc	0.95	0.63	1.11	0.82	0.95	0.87	1.14	0.89	0.48	0.99
						10^8 cyc	3.57	1.34	1.08	1.46	1.24	0.78	0.59	0.97	0.92	0.48
#22	HSLA Stiffener Splice	10.489	11.768	-4.250	0.177	10^3 cyc	1.37	0.91	1.58	1.17	1.35	1.25	1.63	1.28	0.69	1.42
						10^8 cyc	2.17	0.82	0.66	0.89	0.76	0.48	0.36	0.59	0.56	0.29
#23	HSLA Opening Detail	8.517	9.565	-3.480	0.203	10^3 cyc	1.94	1.29	2.25	1.66	1.92	1.78	2.32	1.81	0.98	2.01
						10^8 cyc	5.62	2.11	1.7	2.3	1.95	1.23	0.94	1.52	1.45	0.76
#24	HSLA Flame cut edge	10.369	11.484	-3.705	0.092	10^3 cyc	0.78	0.52	0.9	0.67	0.77	0.71	0.93	0.73	0.39	0.81
						10^8 cyc	1.85	0.69	0.56	0.75	0.64	0.41	0.31	0.5	0.47	0.25
#25	HSLA Insert Plate "Good Weld"	11.733	13.265	-5.090	0.184	10^3 cyc	1.6	1.07	1.86	1.38	1.59	1.47	1.92	1.5	0.81	1.66
						10^8 cyc	1.63	0.61	0.5	0.67	0.57	0.36	0.27	0.44	0.42	0.22
#26	HSLA Insert Plate "Poor Weld"	9.639	10.845	-4.009	0.103	10^3 cyc	1.71	1.14	1.99	1.47	1.7	1.57	2.05	1.6	0.86	1.78
						10^8 cyc	3.21	1.21	0.97	1.31	1.12	0.7	0.53	0.87	0.83	0.43
#27	HSLA one sided welds	9.342	10.335	-3.298	0.307	10^3 cyc	0.88	0.59	1.02	0.75	0.87	0.8	1.05	0.82	0.44	0.91
						10^8 cyc	3.05	1.15	0.93	1.25	1.06	0.67	0.51	0.83	0.79	0.41
#28	HSLA single thickness doubler welds	8.199	9.139	-3.122	0.490	10^3 cyc	1.57	1.04	1.82	1.34	1.55	1.44	1.87	1.46	0.79	1.62
						10^8 cyc	6.63	2.49	2.01	2.71	2.31	1.46	1.11	1.8	1.71	0.89
#29	HSLA double thickness doubler welds	7.733	8.570	-2.780	0.555	10^3 cyc	1.4	0.93	1.62	1.2	1.38	1.28	1.67	1.3	0.7	1.45
						10^8 cyc	9.3	3.5	2.82	3.8	3.23	2.04	1.55	2.52	2.39	1.25
#30	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	0.72	0.48	0.83	0.62	0.71	0.66	0.86	0.67	0.36	0.74
						10^8 cyc	3.53	1.33	1.07	1.44	1.23	0.77	0.59	0.96	0.91	0.47

	BASELINE CONFIGURATION	LOG(Aamp (ksi)	LOG(Amg (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #11	#12	#13	#14	#15	#16	#17	#18	#19	#20
#1	HSLA 7/16" bending, shipyard	12.861	14.405	-5.130	0.378	10^3 cyc	0.45	0.7	0.85	0.35	0.79	0.74	0.36	0.8	0.63	0.49
						10^8 cyc	0.14	0.51	0.27	0.55	0.42	0.33	0.33	0.22	0.34	0.27
#2	HSLA 1/4", continuous cruc., shipyard	10.014	11.244	-4.087	0.350	10^3 cyc	0.68	1.05	1.27	0.53	1.19	1.12	0.54	1.2	0.94	0.73
						10^8 cyc	0.36	1.35	0.73	1.46	1.1	0.87	0.87	0.59	0.9	0.73
#3	HSLA 7/16", continuous cruciform	9.189	10.155	-3.210	0.185	10^3 cyc	0.39	0.6	0.73	0.3	0.68	0.64	0.31	0.69	0.54	0.42
						10^8 cyc	0.45	1.68	0.91	1.81	1.37	1.08	1.08	0.73	1.11	0.91
#4	HSLA 7/16", continuous cruc., shipyard	10.012	11.172	-3.855	0.210	10^3 cyc	0.52	0.82	0.99	0.41	0.92	0.87	0.42	0.93	0.73	0.57
						10^8 cyc	0.33	1.24	0.67	1.35	1.02	0.8	0.8	0.54	0.82	0.67
#5	HSLA 7/16", continuous cruc., lab & syd	9.537	10.589	-3.496	0.205	10^3 cyc	0.45	0.71	0.85	0.35	0.8	0.75	0.36	0.8	0.63	0.49
						10^8 cyc	0.39	1.46	0.79	1.58	1.19	0.94	0.94	0.63	0.97	0.79
#6	HSLA 3/4", continuous cruc., shipyard	8.713	9.656	-3.134	0.172	10^3 cyc	0.49	0.77	0.92	0.38	0.86	0.81	0.39	0.87	0.69	0.53
						10^8 cyc	0.62	2.32	1.25	2.51	1.89	1.48	1.49	1	1.53	1.25
#7	HSLA 1", continuous cruc., shipyard	8.253	9.075	-2.732	0.068	10^3 cyc	0.38	0.59	0.71	0.29	0.66	0.62	0.3	0.67	0.53	0.41
						10^8 cyc	0.82	3.05	1.65	3.3	2.49	1.96	1.96	1.32	2.02	1.65
#8	HSLA discontinuous cruciform	9.075	10.071	-3.307	0.263	10^3 cyc	0.48	0.75	0.91	0.38	0.85	0.8	0.38	0.85	0.67	0.52
						10^8 cyc	0.5	1.88	1.01	2.03	1.53	1.2	1.2	0.81	1.24	1.01
#9	HSLA misaligned cruciform	9.279	10.468	-3.949	0.227	10^3 cyc	0.89	1.39	1.68	0.7	1.57	1.48	0.71	1.58	1.25	0.97
						10^8 cyc	0.53	1.98	1.07	2.14	1.61	1.27	1.27	0.86	1.31	1.07
#10	HSLA non-full penetration disc cruciform	7.994	8.803	-2.686	0.139	10^3 cyc	0.43	0.68	0.82	0.34	0.76	0.72	0.35	0.77	0.61	0.47
						10^8 cyc	1.02	3.78	2.04	4.09	3.09	2.42	2.42	1.64	2.51	2.04
#11	HSLA misaligned partial penetration welds	8.097	9.105	-3.349	0.208	10^3 cyc	1	1.56	1.88	0.78	1.75	1.65	0.8	1.77	1.39	1.08
						10^8 cyc	1	3.72	2.01	4.03	3.04	2.39	2.39	1.62	2.47	2.01
#12	HS continuous cruciform	10.853	12.203	-4.486	0.218	10^3 cyc	0.64	1	1.21	0.5	1.13	1.06	0.51	1.14	0.9	0.69
						10^8 cyc	0.27	1	0.54	1.08	0.82	0.64	0.64	0.43	0.66	0.54
#13	HS discontinuous cruciform	9.144	10.173	-3.417	0.252	10^3 cyc	0.53	0.83	1	0.41	0.93	0.88	0.42	0.94	0.74	0.58
						10^8 cyc	0.5	1.85	1	2	1.51	1.19	1.19	0.8	1.23	1
#14	HS misaligned cruciform	12.618	14.549	-6.416	0.142	10^3 cyc	1.28	2	2.41	1	2.25	2.12	1.02	2.27	1.79	1.39
						10^8 cyc	0.25	0.92	0.5	1	0.75	0.59	0.59	0.4	0.61	0.5
#15	OS continuous cruciform	10.124	11.324	-3.987	0.221	10^3 cyc	0.57	0.89	1.07	0.44	1	0.94	0.45	1.01	0.8	0.62
						10^8 cyc	0.33	1.23	0.66	1.33	1	0.79	0.79	0.53	0.81	0.66
#16	OS discontinuous cruciform	9.577	10.706	-3.752	0.304	10^3 cyc	0.61	0.94	1.14	0.47	1.06	1	0.48	1.07	0.85	0.66
						10^8 cyc	0.42	1.56	0.84	1.69	1.27	1	1	0.68	1.03	0.84
#17	OS misaligned cruciform	10.243	11.725	-4.924	0.149	10^3 cyc	1.26	1.96	2.36	0.98	2.2	2.07	1	2.22	1.75	1.36
						10^8 cyc	0.42	1.56	0.84	1.69	1.27	1	1	0.68	1.03	0.84
#18	HSLA & HS conventional components	8.764	9.746	-3.263	0.214	10^3 cyc	0.57	0.88	1.06	0.44	0.99	0.93	0.45	1	0.79	0.61
						10^8 cyc	0.62	2.31	1.25	2.49	1.88	1.48	1.48	1	1.53	1.25
#19	HSLA SNIPED COMP	9.780	10.989	-4.016	0.139	10^3 cyc	0.72	1.12	1.35	0.56	1.26	1.18	0.57	1.27	1	0.78
						10^8 cyc	0.41	1.51	0.82	1.63	1.23	0.97	0.97	0.65	1	0.82
#20	HSLA INTERCOASTAL	9.459	10.690	-4.088	0.120	10^3 cyc	0.93	1.44	1.74	0.72	1.62	1.53	0.74	1.64	1.29	1
						10^8 cyc	0.5	1.85	1	2	1.51	1.19	1.19	0.8	1.23	1
#21	HSLA CONV CMP R=-1	9.089	10.061	-3.230	0.169	10^3 cyc	0.43	0.67	0.81	0.33	0.75	0.71	0.34	0.76	0.6	0.46
						10^8 cyc	0.49	1.81	0.98	1.96	1.48	1.16	1.16	0.79	1.2	0.98
#22	HSLA Stiffener Splice	10.489	11.768	-4.250	0.177	10^3 cyc	0.62	0.96	1.16	0.48	1.08	1.01	0.49	1.09	0.86	0.66
						10^8 cyc	0.3	1.1	0.6	1.2	0.9	0.71	0.71	0.48	0.73	0.6
#23	HSLA Opening Detail	8.517	9.565	-3.480	0.203	10^3 cyc	0.87	1.36	1.64	0.68	1.53	1.44	0.69	1.54	1.22	0.94
						10^8 cyc	0.77	2.86	1.54	3.09	2.33	1.83	1.83	1.24	1.89	1.54
#24	HSLA Flame cut edge	10.369	11.484	-3.705	0.092	10^3 cyc	0.35	0.55	0.66	0.27	0.61	0.58	0.28	0.62	0.49	0.38
						10^8 cyc	0.25	0.94	0.51	1.02	0.77	0.6	0.6	0.41	0.62	0.51
#25	HSLA Insert Plate "Good Weld"	11.733	13.265	-5.090	0.184	10^3 cyc	0.72	1.13	1.36	0.56	1.27	1.19	0.58	1.28	1.01	0.78
						10^8 cyc	0.22	0.83	0.45	0.9	0.68	0.53	0.53	0.36	0.55	0.45
#26	HSLA Insert Plate "Poor Weld"	9.639	10.845	-4.009	0.103	10^3 cyc	0.77	1.2	1.45	0.6	1.35	1.27	0.61	1.37	1.08	0.83
						10^8 cyc	0.44	1.63	0.88	1.77	1.33	1.05	1.05	0.71	1.08	0.88
#27	HSLA one sided welds	9.342	10.335	-3.298	0.307	10^3 cyc	0.4	0.62	0.74	0.31	0.69	0.65	0.31	0.7	0.55	0.43
						10^8 cyc	0.42	1.55	0.84	1.68	1.27	1	1	0.67	1.03	0.84
#28	HSLA single thickness doubler welds	8.199	9.139	-3.122	0.490	10^3 cyc	0.71	1.1	1.33	0.55	1.24	1.16	0.56	1.25	0.98	0.76
						10^8 cyc	0.91	3.37	1.82	3.65	2.75	2.16	2.16	1.46	2.24	1.82
#29	HSLA double thickness doubler welds	7.733	8.570	-2.780	0.555	10^3 cyc	0.63	0.98	1.18	0.49	1.1	1.04	0.5	1.11	0.88	0.68
						10^8 cyc	1.27	4.73	2.56	5.12	3.86	3.03	3.04	2.05	3.14	2.56
#30	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	0.32	0.5	0.61	0.25	0.57	0.53	0.26	0.57	0.45	0.35
						10^8 cyc	0.48	1.79	0.97	1.94	1.46	1.15	1.15	0.78	1.19	0.97

Spec M-2S

	BASELINE CONFIGURATION	LOG(Aamp (ksi)	LOG(Amg (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #21	#22	#23	#24	#25	#26	#27	#28	#29	#30
#1	HSLA 7/16" bending, shipyard	12.861	14.405	-5.130	0.378	10^3 cyc	1.05	0.73	0.52	1.28	0.62	0.58	1.14	0.64	0.72	1.39
						10^8 cyc	0.28	0.46	0.18	0.54	0.61	0.31	0.33	0.15	0.11	0.28
#2	HSLA 1/4", continuous cruc., shipyard	10.014	11.244	-4.087	0.350	10^3 cyc	1.58	1.1	0.77	1.93	0.93	0.88	1.71	0.96	1.08	2.09
						10^8 cyc	0.75	1.22	0.47	1.44	1.63	0.83	0.87	0.4	0.29	0.75
#3	HSLA 7/16", continuous cruciform	9.189	10.155	-3.210	0.185	10^3 cyc	0.9	0.63	0.44	1.11	0.54	0.5	0.98	0.55	0.62	1.2
						10^8 cyc	0.92	1.52	0.59	1.79	2.02	1.03	1.08	0.5	0.35	0.93
#4	HSLA 7/16", continuous cruc., shipyard	10.012	11.172	-3.855	0.210	10^3 cyc	1.22	0.85	0.6	1.5	0.73	0.68	1.33	0.74	0.83	1.62
						10^8 cyc	0.69	1.13	0.44	1.33	1.5	0.76	0.8	0.37	0.26	0.69
#5	HSLA 7/16", continuous cruc., lab & syd	9.537	10.589	-3.496	0.205	10^3 cyc	1.06	0.74	0.52	1.29	0.63	0.59	1.15	0.64	0.72	1.41
						10^8 cyc	0.81	1.32	0.51	1.56	1.76	0.9	0.94	0.43	0.31	0.82
#6	HSLA 3/4", continuous cruc., shipyard	8.713	9.656	-3.134	0.172	10^3 cyc	1.14	0.8	0.56	1.4	0.68	0.64	1.24	0.7	0.78	1.52
						10^8 cyc	1.28	2.1	0.81	2.47	2.79	1.42	1.49	0.69	0.49	1.29
#7	HSLA 1", continuous cruc., shipyard	8.253	9.075	-2.732	0.068	10^3 cyc	0.88	0.61	0.43	1.07	0.52	0.49	0.95	0.53	0.6	1.17
						10^8 cyc	1.68	2.76	1.07	3.25	3.67	1.87	1.96	0.9	0.64	1.7
#8	HSLA discontinuous cruciform	9.075	10.071	-3.307	0.263	10^3 cyc	1.12	0.78	0.55	1.38	0.67	0.62	1.22	0.68	0.77	1.49
						10^8 cyc	1.03	1.7	0.66	2	2.26	1.15	1.21	0.56	0.4	1.05
#9	HSLA misaligned cruciform	9.279	10.468	-3.949	0.227	10^3 cyc	2.09	1.45	1.02	2.55	1.24	1.16	2.26	1.27	1.42	2.77
						10^8 cyc	1.09	1.79	0.69	2.11	2.38	1.21	1.27	0.59	0.42	1.1
#10	HSLA non-full penetration disc cruciform	7.994	8.803	-2.686	0.139	10^3 cyc	1.01	0.71	0.5	1.24	0.6	0.56	1.1	0.62	0.69	1.34
						10^8 cyc	2.08	3.42	1.32	4.03	4.55	2.32	2.43	1.12	0.8	2.11
#11	HSLA misaligned partial penetration welds	8.097	9.105	-3.349	0.208	10^3 cyc	2.33	1.63	1.15	2.85	1.38	1.3	2.53	1.42	1.59	3.09
						10^8 cyc	2.05	3.37	1.3	3.97	4.48	2.28	2.4	1.1	0.79	2.07
#12	HS continuous cruciform	10.853	12.203	-4.486	0.218	10^3 cyc	1.5	1.04	0.74	1.83	0.89	0.83	1.62	0.91	1.02	1.99
						10^8 cyc	0.55	0.9	0.35	1.07	1.2	0.61	0.64	0.3	0.21	0.56
#13	HS discontinuous cruciform	9.144	10.173	-3.417	0.252	10^3 cyc	1.24	0.87	0.61	1.52	0.74	0.69	1.35	0.75	0.85	1.65
						10^8 cyc	1.02	1.68	0.65	1.97	2.23	1.13	1.19	0.55	0.39	1.03
#14	HS misaligned cruciform	12.618	14.549	-6.416	0.142	10^3 cyc	2.99	2.09	1.47	3.66	1.78	1.66	3.25	1.82	2.04	3.97
						10^8 cyc	0.51	0.84	0.32	0.98	1.11	0.57	0.6	0.27	0.2	0.51
#15	OS continuous cruciform	10.124	11.324	-3.987	0.221	10^3 cyc	1.33	0.93	0.65	1.63	0.79	0.74	1.44	0.81	0.91	1.77
						10^8 cyc	0.68	1.11	0.43	1.31	1.47	0.75	0.79	0.36	0.26	0.68
#16	OS discontinuous cruciform	9.577	10.706	-3.752	0.304	10^3 cyc	1.41	0.99	0.69	1.73	0.84	0.79	1.53	0.86	0.96	1.88
						10^8 cyc	0.86	1.41	0.55	1.66	1.88	0.96	1	0.46	0.33	0.87
#17	OS misaligned cruciform	10.243	11.725	-4.924	0.149	10^3 cyc	2.93	2.04	1.44	3.58	1.74	1.63	3.18	1.78	2	3.89
						10^8 cyc	0.86	1.41	0.55	1.66	1.88	0.96	1	0.46	0.33	0.87
#18	HSLA & HS conventional components	8.764	9.746	-3.263	0.214	10^3 cyc	1.32	0.92	0.65	1.61	0.78	0.73	1.43	0.8	0.9	1.75
						10^8 cyc	1.27	2.09	0.81	2.46	2.78	1.41	1.48	0.68	0.49	1.28
#19	HSLA SNIPED COMP	9.780	10.989	-4.016	0.139	10^3 cyc	1.67	1.17	0.82	2.04	0.99	0.93	1.81	1.02	1.14	2.22
						10^8 cyc	0.83	1.37	0.53	1.61	1.82	0.92	0.97	0.45	0.32	0.84
#20	HSLA INTERCOASTAL	9.459	10.690	-4.088	0.120	10^3 cyc	2.16	1.5	1.06	2.64	1.28	1.2	2.34	1.31	1.47	2.86
						10^8 cyc	1.02	1.67	0.65	1.97	2.23	1.13	1.19	0.55	0.39	1.03
#21	HSLA CONV CMP R=-1	9.089	10.061	-3.230	0.169	10^3 cyc	1	0.7	0.49	1.22	0.59	0.56	1.09	0.61	0.68	1.33
						10^8 cyc	1	1.64	0.63	1.93	2.18	1.11	1.17	0.54	0.38	1.01
#22	HSLA Stiffener Splice	10.489	11.768	-4.250	0.177	10^3 cyc	1.43	1	0.7	1.75	0.85	0.8	1.56	0.87	0.98	1.9
						10^8 cyc	0.61	1	0.39	1.18	1.33	0.68	0.71	0.33	0.23	0.62
#23	HSLA Opening Detail	8.517	9.565	-3.480	0.203	10^3 cyc	2.03	1.42	1	2.49	1.21	1.13	2.21	1.24	1.39	2.7
						10^8 cyc	1.58	2.58	1	3.04	3.44	1.75	1.84	0.85	0.6	1.59
#24	HSLA Flame cut edge	10.369	11.484	-3.705	0.092	10^3 cyc	0.82	0.57	0.4	1	0.49	0.45	0.89	0.5	0.56	1.09
						10^8 cyc	0.52	0.85	0.33	1	1.13	0.58	0.6	0.28	0.2	0.52
#25	HSLA Insert Plate "Good Weld"	11.733	13.265	-5.090	0.184	10^3 cyc	1.68	1.18	0.83	2.06	1	0.94	1.83	1.02	1.15	2.24
						10^8 cyc	0.46	0.75	0.29	0.88	1	0.51	0.53	0.25	0.18	0.46
#26	HSLA Insert Plate "Poor Weld"	9.639	10.845	-4.009	0.103	10^3 cyc	1.8	1.26	0.88	2.2	1.07	1	1.95	1.09	1.23	2.39
						10^8 cyc	0.9	1.48	0.57	1.74	1.97	1	1.05	0.48	0.34	0.91
#27	HSLA one sided welds	9.342	10.335	-3.298	0.307	10^3 cyc	0.92	0.64	0.45	1.13	0.55	0.51	1	0.56	0.63	1.22
						10^8 cyc	0.86	1.41	0.54	1.65	1.87	0.95	1	0.46	0.33	0.87
#28	HSLA single thickness doubler welds	8.199	9.139	-3.122	0.490	10^3 cyc	1.64	1.15	0.81	2.01	0.98	0.91	1.78	1	1.12	2.18
						10^8 cyc	1.86	3.05	1.18	3.59	4.06	2.07	2.17	1	0.71	1.88
#29	HSLA double thickness doubler welds	7.733	8.570	-2.780	0.555	10^3 cyc	1.47	1.02	0.72	1.79	0.87	0.81	1.59	0.89	1	1.95
						10^8 cyc	2.61	4.28	1.66	5.04	5.7	2.9	3.05	1.4	1	2.64
#30	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	0.75	0.53	0.37	0.92	0.45	0.42	0.82	0.46	0.51	1
						10^8 cyc	0.99	1.62	0.63	1.91	2.16	1.1	1.16	0.53	0.38	1

SSC-318 (Munse Test Specimen Data) RMS Fatigue Strength Ratios Associated with a 50% Probability of Failure

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #1	#2	#3	#4	#5	#6	#7	#8	#9	#10
#1	SSC:1(all steels)	Baseplate	13.825	15.550	-5.729	0.75	10^3 cyc	1	0.33	0.34	1.3	1.19	0.83	0.61	0.57	0.62	0.81
							10^8 cyc	1	0.96	1.2	1.06	0.81	0.93	0.66	0.7	0.61	0.18
#2	SSC:1M	Baseplate Mild Steel	21.679	25.360	-12.229	0.71	10^3 cyc	3.02	1	1.03	3.93	3.61	2.52	1.86	1.74	1.87	2.46
							10^8 cyc	1.04	1	1.25	1.1	0.84	0.96	0.69	0.73	0.63	0.19
#3	SSC:1H	Baseplate HSLA Steel	27.389	32.040	-15.449	0.91	10^3 cyc	2.95	0.98	1	3.83	3.52	2.46	1.81	1.69	1.83	2.39
							10^8 cyc	0.83	0.8	1	0.88	0.68	0.77	0.55	0.59	0.5	0.15
#4	SSC:1Q	Baseplate Q & T Steel	13.345	14.910	-5.199	0.68	10^3 cyc	0.77	0.25	0.26	1	0.92	0.64	0.47	0.44	0.48	0.63
							10^8 cyc	0.94	0.91	1.13	1	0.77	0.88	0.62	0.66	0.57	0.17
#5	SSC:1(F)	Baseplate Flame Cut	12.334	13.780	-4.805	0.60	10^3 cyc	0.84	0.28	0.28	1.09	1	0.7	0.51	0.48	0.52	0.68
							10^8 cyc	1.23	1.19	1.48	1.3	1	1.14	0.82	0.87	0.75	0.22
#6	SSC:2	Rolled I-Beam Bending	13.999	15.820	-6.048	0.64	10^3 cyc	1.2	0.4	0.41	1.56	1.43	1	0.74	0.69	0.74	0.97
							10^8 cyc	1.08	1.04	1.3	1.14	0.87	1	0.71	0.76	0.65	0.19
#7	SSC:3	Longitudinal Seam	13.010	14.800	-5.946	0.63	10^3 cyc	1.63	0.54	0.55	2.11	1.94	1.36	1	0.94	1.01	1.32
							10^8 cyc	1.51	1.46	1.82	1.6	1.23	1.4	1	1.06	0.92	0.27
#8	SSC:3(G)	Ground Long. Seam	13.602	15.520	-6.370	0.74	10^3 cyc	1.74	0.58	0.59	2.26	2.08	1.45	1.07	1	1.08	1.41
							10^8 cyc	1.42	1.37	1.71	1.5	1.15	1.32	0.94	1	0.86	0.26
#9	SSC:4	Long. Fillet Weld Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	1.61	0.53	0.55	2.1	1.93	1.35	0.99	0.93	1	1.31
							10^8 cyc	1.65	1.59	1.98	1.75	1.34	1.53	1.09	1.16	1	0.3
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	8.663	9.650	-3.278	0.48	10^3 cyc	1.23	0.41	0.42	1.6	1.47	1.03	0.76	0.71	0.76	1
							10^8 cyc	5.53	5.32	6.64	5.85	4.49	5.13	3.66	3.89	3.35	1
#11	SSC:6	Dbl I-Bm Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	1.61	0.53	0.55	2.1	1.93	1.35	0.99	0.93	1	1.31
							10^8 cyc	1.65	1.59	1.98	1.75	1.34	1.53	1.09	1.16	1	0.3
#12	SSC:7B	I-Bm w/wrt Web Stiff Bndg	10.095	11.230	-3.771	0.53	10^3 cyc	0.9	0.3	0.3	1.17	1.07	0.75	0.55	0.52	0.56	0.73
							10^8 cyc	2.55	2.45	3.06	2.7	2.07	2.36	1.68	1.79	1.54	0.46
#13	SSC:7P	I-Bm w/wrt Web St Prin Stress	10.204	11.460	-4.172	0.51	10^3 cyc	1.32	0.44	0.45	1.71	1.58	1.1	0.81	0.76	0.82	1.07
							10^8 cyc	2.79	2.69	3.35	2.96	2.27	2.59	1.85	1.97	1.69	0.5
#14	SSC:8	Bolted Double Lap	14.469	16.440	-6.549	0.81	10^3 cyc	1.44	0.48	0.49	1.87	1.72	1.2	0.88	0.83	0.89	1.17
							10^8 cyc	1.12	1.08	1.34	1.18	0.91	1.04	0.74	0.79	0.68	0.2
#15	SSC:9	Riveted Single Lap	16.687	19.590	-9.643	0.90	10^3 cyc	3.54	1.17	1.2	4.6	4.23	2.95	2.18	2.04	2.19	2.88
							10^8 cyc	1.57	1.51	1.88	1.66	1.27	1.45	1.04	1.1	0.95	0.28
#16	SSC:10M	Butt Weld Axial:Mild Steel	14.345	16.630	-7.589	0.88	10^3 cyc	2.73	0.9	0.93	3.55	3.26	2.28	1.68	1.57	1.69	2.22
							10^8 cyc	1.67	1.61	2	1.77	1.35	1.55	1.1	1.17	1.01	0.3
#17	SSC:10H	Butt Weld Axial:HSLA Steel	22.068	25.920	-12.795	0.96	10^3 cyc	3.35	1.11	1.14	4.35	4	2.8	2.06	1.93	2.08	2.72
							10^8 cyc	1.1	1.06	1.33	1.17	0.9	1.02	0.73	0.78	0.67	0.2
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	12.108	13.650	-5.124	0.76	10^3 cyc	1.25	0.41	0.42	1.62	1.49	1.04	0.77	0.72	0.77	1.01
							10^8 cyc	1.58	1.52	1.9	1.68	1.29	1.47	1.05	1.11	0.96	0.29
#19	SSC:10(G)	Butt Weld Axial:Ground	14.784	16.930	-7.130	0.94	10^3 cyc	1.86	0.61	0.63	2.41	2.22	1.55	1.14	1.07	1.15	1.51
							10^8 cyc	1.25	1.2	1.5	1.32	1.02	1.16	0.83	0.88	0.76	0.23
#20	SSC:10A	Butt Weld Bndg	12.494	14.140	-5.468	0.79	10^3 cyc	1.4	0.46	0.48	1.82	1.67	1.17	0.86	0.81	0.87	1.14
							10^8 cyc	1.54	1.49	1.85	1.63	1.25	1.43	1.02	1.09	0.93	0.28
#21	SSC:11	I-Bm Butt Weld Bndg	12.035	13.770	-5.765	0.68	10^3 cyc	2.1	0.7	0.71	2.74	2.51	1.76	1.29	1.21	1.3	1.71
							10^8 cyc	2.08	2	2.5	2.2	1.69	1.93	1.37	1.46	1.26	0.38
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	10.366	11.690	-4.398	0.43	10^3 cyc	1.51	0.5	0.51	1.96	1.8	1.26	0.93	0.87	0.94	1.23
							10^8 cyc	2.77	2.67	3.33	2.94	2.25	2.57	1.83	1.95	1.68	0.5
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	12.415	14.120	-5.663	0.60	10^3 cyc	1.68	0.56	0.57	2.18	2.01	1.4	1.03	0.97	1.04	1.37
							10^8 cyc	1.72	1.66	2.07	1.82	1.4	1.6	1.14	1.21	1.04	0.31
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	10.847	12.120	-4.229	0.45	10^3 cyc	0.98	0.33	0.33	1.28	1.18	0.82	0.61	0.57	0.61	0.8
							10^8 cyc	2.01	1.93	2.41	2.13	1.63	1.86	1.33	1.41	1.22	0.36
#25	SSC:14	Disc. Cruciform Axial	14.721	16.960	-7.439	0.91	10^3 cyc	2.25	0.74	0.76	2.92	2.69	1.88	1.38	1.29	1.39	1.83
							10^8 cyc	1.42	1.37	1.7	1.5	1.15	1.32	0.94	1	0.86	0.26
#26	SSC:15	Loaded Edge Attachment Plate	9.566	10.830	-4.200	0.43	10^3 cyc	1.93	0.64	0.65	2.5	2.3	1.61	1.18	1.11	1.19	1.56
							10^8 cyc	4	3.85	4.81	4.24	3.25	3.71	2.65	2.82	2.42	0.72
#27	SSC:16	Partial Pen. Butt Weld	10.626	12.020	-4.631	0.58	10^3 cyc	1.64	0.54	0.56	2.13	1.95	1.37	1.01	0.94	1.01	1.33
							10^8 cyc	2.63	2.54	3.17	2.79	2.14	2.44	1.74	1.85	1.6	0.48
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	13.455	15.550	-6.960	0.95	10^3 cyc	2.6	0.86	0.88	3.38	3.11	2.17	1.6	1.5	1.61	2.12
							10^8 cyc	1.82	1.76	2.19	1.93	1.48	1.69	1.21	1.28	1.11	0.33
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	9.265	10.390	-3.736	0.34	10^3 cyc	1.43	0.47	0.49	1.86	1.71	1.2	0.88	0.82	0.89	1.16
							10^8 cyc	4.19	4.03	5.03	4.43	3.4	3.88	2.77	2.95	2.54	0.76
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	3.38	1.12	1.15	4.4	4.04	2.82	2.08	1.94	2.1	2.75
							10^8 cyc	1.99	1.92	2.39	2.11	1.62	1.85	1.32	1.4	1.21	0.36
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	9.097	10.140	-3.465	0.39	10^3 cyc	1.16	0.38	0.39	1.51	1.39	0.97	0.71	0.67	0.72	0.94
							10^8 cyc	4.31	4.15	5.18	4.57	3.5	4	2.85	3.04	2.61	0.78
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	3.38	1.12	1.15	4.4	4.04	2.82	2.08	1.94	2.1	2.75
							10^8 cyc	1.99	1.92	2.39	2.11	1.62	1.85	1.32	1.4	1.21	0.36
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	9.048	10.260	-4.027	0.65	10^3 cyc	2.19	0.73	0.74	2.85	2.62	1.83	1.35	1.26	1.36	1.78
							10^8 cyc	5.12	4.93	6.16	5.42	4.16	4.75	3.39	3.61	3.1	0.93
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	15.241	18.020	-9.233	0.75	10^3 cyc	4.32	1.43	1.47	5.62	5.16	3.61	2.66	2.48	2.68	3.51
							10^8 cyc	2.02	1.94	2.42	2.13	1.64	1.87	1.33	1.42	1.22	0.36
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	12.941	15.190	-7.472	0.93	10^3 cyc	3.96	1.31	1.34	5.15	4.73	3.31	2.44	2.28	2.46	3.22
							10^8 cyc	2.48	2.39	2.98	2.63	2.01	2.3	1.64	1.75	1.5	0.45

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #1	#2	#3	#4	#5	#6	#7	#8	#9	#10
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	13.566	15.830	-7.520	0.93	10^3 cyc	3.34	1.11	1.14	4.35	4	2.79	2.06	1.92	2.07	2.72
							10^8 cyc	2.07	2	2.49	2.19	1.68	1.92	1.37	1.46	1.26	0.37
#37	SSC:20	Plate Penetration: Axial	10.180	11.570	-4.619	0.66	10^3 cyc	2.02	0.67	0.69	2.63	2.41	1.69	1.24	1.16	1.25	1.64
							10^8 cyc	3.28	3.16	3.94	3.47	2.68	3.04	2.17	2.31	1.98	0.59
#38	SSC:20(S)	Plate Penetration: Shear	12.695	14.730	-6.759	0.93	10^3 cyc	3.01	1	1.02	3.92	3.6	2.51	1.85	1.73	1.87	2.45
							10^8 cyc	2.22	2.14	2.67	2.35	1.8	2.06	1.47	1.56	1.34	0.4
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	22.432	26.720	-14.245	0.62	10^3 cyc	4.67	1.55	1.59	6.07	5.58	3.9	2.87	2.69	2.9	3.8
							10^8 cyc	1.41	1.35	1.69	1.49	1.14	1.3	0.93	0.99	0.85	0.25
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	20.826	25.490	-15.494	0.62	10^3 cyc	7.91	2.62	2.68	10.28	9.45	6.6	4.86	4.55	4.9	6.43
							10^8 cyc	2.23	2.15	2.68	2.36	1.81	2.07	1.47	1.57	1.35	0.4
#41	SSC:21(S)	Plate Penetration: Shear	14.765	16.980	-7.358	0.83	10^3 cyc	2.12	0.7	0.72	2.76	2.54	1.77	1.31	1.22	1.32	1.73
							10^8 cyc	1.36	1.31	1.64	1.44	1.1	1.26	0.9	0.96	0.82	0.25
#42	SSC:22	Tee with Stud Attachment: Bndg	9.093	10.040	-3.147	0.32	10^3 cyc	0.75	0.25	0.26	0.98	0.9	0.63	0.46	0.43	0.47	0.61
							10^8 cyc	3.92	3.77	4.71	4.15	3.18	3.63	2.59	2.76	2.37	0.71
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.87	0.29	0.29	1.13	1.04	0.72	0.53	0.5	0.54	0.7
							10^8 cyc	4.3	4.14	5.17	4.56	3.49	3.99	2.85	3.03	2.61	0.78
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.87	0.29	0.29	1.13	1.04	0.72	0.53	0.5	0.54	0.7
							10^8 cyc	4.3	4.14	5.17	4.56	3.49	3.99	2.85	3.03	2.61	0.78
#45	SSC:25	Continuous Cruciform	13.656	15.790	-7.090	0.78	10^3 cyc	2.62	0.87	0.89	3.4	3.12	2.18	1.61	1.5	1.62	2.13
							10^8 cyc	1.78	1.71	2.14	1.88	1.44	1.65	1.18	1.25	1.08	0.32
#46	SSC:25A	Plate with Transv. Side Attachment	16.906	19.470	-8.518	0.91	10^3 cyc	2.07	0.69	0.7	2.69	2.47	1.73	1.27	1.19	1.28	1.68
							10^8 cyc	1.07	1.03	1.29	1.14	0.87	0.99	0.71	0.75	0.65	0.19
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	13.053	15.150	-6.966	0.63	10^3 cyc	2.98	0.99	1.01	3.88	3.56	2.49	1.83	1.72	1.85	2.42
							10^8 cyc	2.09	2.01	2.51	2.21	1.69	1.94	1.38	1.47	1.26	0.38
#48	SSC:26	Welded Cover Plate	9.122	10.130	-3.348	0.61	10^3 cyc	0.98	0.32	0.33	1.27	1.17	0.82	0.6	0.56	0.61	0.8
							10^8 cyc	4.09	3.94	4.92	4.34	3.32	3.8	2.71	2.88	2.48	0.74
#49	SSC:27	Double Lapped Plate with Plug Welds	8.453	9.400	-3.146	0.58	10^3 cyc	1.2	0.4	0.41	1.56	1.43	1	0.74	0.69	0.74	0.98
							10^8 cyc	6.25	6.02	7.52	6.62	5.08	5.8	4.14	4.4	3.79	1.13
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	10.471	12.060	-5.277	0.54	10^3 cyc	2.9	0.96	0.98	3.77	3.46	2.42	1.78	1.67	1.8	2.36
							10^8 cyc	3.44	3.32	4.14	3.65	2.8	3.2	2.28	2.42	2.09	0.62
#51	SSC:28	Baseplate with Circular Hole	15.078	17.410	-7.746	0.81	10^3 cyc	2.37	0.78	0.8	3.08	2.83	1.98	1.46	1.36	1.47	1.93
							10^8 cyc	1.4	1.35	1.69	1.49	1.14	1.3	0.93	0.99	0.85	0.25
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.919	9.870	-3.159	0.31	10^3 cyc	0.87	0.29	0.3	1.13	1.04	0.73	0.54	0.5	0.54	0.71
							10^8 cyc	4.46	4.3	5.36	4.73	3.62	4.14	2.95	3.14	2.7	0.81
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.566	10.580	-3.368	0.10	10^3 cyc	0.74	0.25	0.25	0.97	0.89	0.62	0.46	0.43	0.46	0.6
							10^8 cyc	3.04	2.93	3.65	3.22	2.47	2.82	2.01	2.14	1.84	0.55
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	9.361	10.670	-4.348	0.62	10^3 cyc	2.45	0.81	0.83	3.18	2.93	2.04	1.51	1.41	1.52	1.99
							10^8 cyc	4.64	4.47	5.57	4.91	3.77	4.3	3.07	3.27	2.81	0.84
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	9.091	10.130	-3.453	0.44	10^3 cyc	1.15	0.38	0.39	1.49	1.37	0.96	0.71	0.66	0.71	0.93
							10^8 cyc	4.32	4.16	5.19	4.57	3.5	4	2.85	3.04	2.61	0.78
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	9.566	10.830	-4.200	0.43	10^3 cyc	1.93	0.64	0.65	2.5	2.3	1.61	1.18	1.11	1.19	1.56
							10^8 cyc	4	3.85	4.81	4.24	3.25	3.71	2.65	2.82	2.42	0.72
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	8.646	9.710	-3.533	0.62	10^3 cyc	1.69	0.56	0.57	2.2	2.02	1.41	1.04	0.97	1.05	1.38
							10^8 cyc	5.9	5.68	7.09	6.25	4.79	5.47	3.9	4.15	3.57	1.07
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	8.758	9.860	-3.660	0.50	10^3 cyc	1.81	0.6	0.61	2.35	2.16	1.51	1.11	1.04	1.12	1.47
							10^8 cyc	5.63	5.43	6.77	5.97	4.57	5.23	3.73	3.97	3.41	1.02
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	16.469	19.590	-10.368	0.81	10^3 cyc	4.8	1.59	1.63	6.24	5.73	4	2.95	2.76	2.97	3.9
							10^8 cyc	1.95	1.88	2.35	2.07	1.58	1.81	1.29	1.37	1.18	0.35
#60	SSC:35	Butt Weld with Backing Bar	9.604	10.750	-3.808	0.28	10^3 cyc	1.26	0.42	0.43	1.64	1.51	1.05	0.78	0.73	0.78	1.03
							10^8 cyc	3.48	3.35	4.18	3.68	2.82	3.23	2.3	2.45	2.11	0.63
#61	SSC:36	Skip Welded Plates with Rathole	13.053	15.150	-6.966	0.63	10^3 cyc	2.98	0.99	1.01	3.88	3.56	2.49	1.83	1.72	1.85	2.42
							10^8 cyc	2.09	2.01	2.51	2.21	1.69	1.94	1.38	1.47	1.26	0.38
#62	SSC:36A	Skip Welded Plates	11.326	12.880	-5.163	0.46	10^3 cyc	1.83	0.61	0.62	2.38	2.19	1.53	1.12	1.05	1.13	1.49
							10^8 cyc	2.28	2.2	2.74	2.42	1.85	2.12	1.51	1.61	1.38	0.41
#63	SSC:38	Stiffener Plate Penetration: Bndg	9.128	10.170	-3.462	0.36	10^3 cyc	1.13	0.37	0.38	1.47	1.35	0.94	0.7	0.65	0.7	0.92
							10^8 cyc	4.22	4.07	5.07	4.47	3.43	3.92	2.79	2.97	2.56	0.76
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	14.312	17.390	-10.225	0.88	10^3 cyc	7.44	2.46	2.52	9.67	8.89	6.21	4.57	4.28	4.61	6.05
							10^8 cyc	3.08	2.96	3.69	3.26	2.5	2.85	2.03	2.16	1.86	0.56
#65	SSC:40	Stiffener Intersection: Bending	8.646	9.710	-3.533	0.62	10^3 cyc	1.69	0.56	0.57	2.2	2.02	1.41	1.04	0.97	1.05	1.38
							10^8 cyc	5.9	5.68	7.09	6.25	4.79	5.47	3.9	4.15	3.57	1.07
#66	SSC:42	Bending of Long Attachment	14.765	16.980	-7.358	0.83	10^3 cyc	2.12	0.7	0.72	2.76	2.54	1.77	1.31	1.22	1.32	1.73
							10^8 cyc	1.36	1.31	1.64	1.44	1.1	1.26	0.9	0.96	0.82	0.25
#67	SSC:46	Long. Welds on Support Gussets: Axial	9.361	10.670	-4.348	0.62	10^3 cyc	2.45	0.81	0.83	3.18	2.93	2.04	1.51	1.41	1.52	1.99
							10^8 cyc	4.64	4.47	5.57	4.91	3.77	4.3	3.07	3.27	2.81	0.84
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.781	10.930	-3.818	0.07	10^3 cyc	1.15	0.38	0.39	1.49	1.37	0.96	0.71	0.66	0.71	0.93
							10^8 cyc	3.14	3.02	3.77	3.32	2.55	2.91	2.08	2.21	1.9	0.57
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bnd	10.023	11.240	-4.042	0.19	10^3 cyc	1.27	0.42	0.43	1.66	1.52	1.06	0.78	0.73	0.79	1.04
							10^8 cyc	2.95	2.84	3.54	3.12	2.39	2.74	1.95	2.08	1.79	0.53
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.64	0.21	0.22	0.83	0.77	0.54	0.39	0.37	0.4	0.52
							10^8 cyc	3.99	3.85	4.8	4.23	3.24	3.71	2.64	2.81	2.42	0.72

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE)									
								#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
#1	SSC:1(all steels)	Baseplate	13.825	15.550	-5.729	0.75	10^3 cyc	0.62	1.11	0.76	0.7	0.28	0.37	0.3	0.8	0.54	0.71
							10^8 cyc	0.61	0.39	0.36	0.89	0.64	0.6	0.91	0.63	0.8	0.65
#2	SSC:1M	Baseplate Mild Steel	21.679	25.360	-12.229	0.71	10^3 cyc	1.87	3.37	2.29	2.1	0.85	1.11	0.9	2.42	1.63	2.16
							10^8 cyc	0.63	0.41	0.37	0.93	0.66	0.62	0.94	0.66	0.83	0.67
#3	SSC:1H	Baseplate HSLA Steel	27.389	32.040	-15.449	0.91	10^3 cyc	1.83	3.28	2.23	2.05	0.83	1.08	0.88	2.36	1.59	2.1
							10^8 cyc	0.5	0.33	0.3	0.74	0.53	0.5	0.75	0.53	0.67	0.54
#4	SSC:1Q	Baseplate Q & T Steel	13.345	14.910	-5.199	0.68	10^3 cyc	0.48	0.86	0.58	0.54	0.22	0.28	0.23	0.62	0.41	0.55
							10^8 cyc	0.57	0.37	0.34	0.85	0.6	0.57	0.86	0.6	0.76	0.61
#5	SSC:1(F)	Baseplate Flame Cut	12.334	13.780	-4.805	0.60	10^3 cyc	0.52	0.93	0.63	0.58	0.24	0.31	0.25	0.67	0.45	0.6
							10^8 cyc	0.75	0.48	0.44	1.1	0.79	0.74	1.12	0.78	0.99	0.8
#6	SSC:2	Rolled I-Beam Bending	13.999	15.820	-6.048	0.64	10^3 cyc	0.74	1.34	0.91	0.83	0.34	0.44	0.36	0.96	0.65	0.85
							10^8 cyc	0.65	0.42	0.39	0.96	0.69	0.65	0.98	0.68	0.86	0.7
#7	SSC:3	Longitudinal Seam	13.010	14.800	-5.946	0.63	10^3 cyc	1.01	1.81	1.23	1.13	0.46	0.6	0.49	1.3	0.88	1.16
							10^8 cyc	0.92	0.59	0.54	1.35	0.97	0.91	1.37	0.95	1.21	0.98
#8	SSC:3(G)	Ground Long. Seam	13.602	15.520	-6.370	0.74	10^3 cyc	1.08	1.94	1.32	1.21	0.49	0.64	0.52	1.39	0.94	1.24
							10^8 cyc	0.86	0.56	0.51	1.27	0.91	0.85	1.29	0.9	1.14	0.92
#9	SSC:4	Long. Fillet Weld Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	1	1.8	1.22	1.12	0.46	0.59	0.48	1.29	0.87	1.15
							10^8 cyc	1	0.65	0.59	1.48	1.05	0.99	1.5	1.04	1.32	1.07
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	8.663	9.650	-3.278	0.48	10^3 cyc	0.76	1.37	0.93	0.86	0.35	0.45	0.37	0.99	0.66	0.88
							10^8 cyc	3.35	2.17	1.98	4.95	3.53	3.32	5.01	3.49	4.42	3.58
#11	SSC:6	Dbl I-Bm Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	1	1.8	1.22	1.12	0.46	0.59	0.48	1.29	0.87	1.15
							10^8 cyc	1	0.65	0.59	1.48	1.05	0.99	1.5	1.04	1.32	1.07
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	10.095	11.230	-3.771	0.53	10^3 cyc	0.56	1	0.68	0.62	0.25	0.33	0.27	0.72	0.48	0.64
							10^8 cyc	1.54	1	0.91	2.28	1.63	1.53	2.31	1.61	2.04	1.65
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	10.204	11.460	-4.172	0.51	10^3 cyc	0.82	1.47	1	0.92	0.37	0.48	0.39	1.08	0.71	0.94
							10^8 cyc	1.69	1.1	1	2.5	1.78	1.67	2.53	1.76	2.23	1.81
#14	SSC:8	Bolted Double Lap	14.489	16.440	-6.549	0.81	10^3 cyc	0.89	1.6	1.09	1	0.41	0.53	0.43	1.15	0.77	1.03
							10^8 cyc	0.68	0.44	0.4	1	0.71	0.67	1.01	0.71	0.89	0.72
#15	SSC:9	Riveted Single Lap	16.687	19.590	-9.643	0.90	10^3 cyc	2.19	3.95	2.68	2.46	1	1.3	1.06	2.83	1.91	2.53
							10^8 cyc	0.95	0.61	0.56	1.4	1	0.94	1.42	0.99	1.25	1.01
#16	SSC:10M	Butt Weld Axial:Mild Steel	14.345	16.630	-7.589	0.88	10^3 cyc	1.69	3.04	2.07	1.9	0.77	1	0.81	2.18	1.47	1.95
							10^8 cyc	1.01	0.65	0.6	1.49	1.06	1	1.51	1.05	1.33	1.08
#17	SSC:10H	Butt Weld Axial:HSLA Steel	22.068	25.920	-12.795	0.96	10^3 cyc	2.08	3.73	2.54	2.33	0.95	1.23	1	2.68	1.8	2.39
							10^8 cyc	0.67	0.43	0.4	0.99	0.71	0.66	1	0.7	0.88	0.72
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	12.108	13.650	-5.124	0.76	10^3 cyc	0.77	1.39	0.95	0.87	0.35	0.46	0.37	1	0.67	0.89
							10^8 cyc	0.96	0.62	0.57	1.42	1.01	0.95	1.43	1	1.27	1.03
#19	SSC:10(G)	Butt Weld Axial:Ground	14.784	16.930	-7.130	0.94	10^3 cyc	1.15	2.07	1.41	1.29	0.52	0.68	0.55	1.49	1	1.32
							10^8 cyc	0.76	0.49	0.45	1.12	0.8	0.75	1.13	0.79	1	0.81
#20	SSC:10A	Butt Weld Bndg	12.494	14.140	-5.468	0.79	10^3 cyc	0.87	1.56	1.06	0.98	0.4	0.51	0.42	1.12	0.76	1
							10^8 cyc	0.93	0.61	0.55	1.38	0.99	0.93	1.4	0.97	1.23	1
#21	SSC:11	I-Bm Butt Weld Bndg	12.035	13.770	-5.765	0.68	10^3 cyc	1.3	2.35	1.6	1.46	0.59	0.77	0.63	1.69	1.13	1.5
							10^8 cyc	1.26	0.82	0.74	1.86	1.33	1.25	1.88	1.31	1.66	1.35
#22	SSC:12	Tee Stiffnr Tapered Flg Thickness Bndg	10.366	11.690	-4.398	0.43	10^3 cyc	0.94	1.68	1.14	1.05	0.43	0.55	0.45	1.21	0.81	1.08
							10^8 cyc	1.68	1.09	0.99	2.48	1.77	1.66	2.51	1.75	2.22	1.8
#23	SSC:12(G)	Tee Stiffnr Tapered Flg Thickness Bndg	12.415	14.120	-5.663	0.60	10^3 cyc	1.04	1.87	1.27	1.17	0.47	0.62	0.5	1.35	0.91	1.2
							10^8 cyc	1.04	0.68	0.62	1.54	1.1	1.03	1.56	1.09	1.38	1.11
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	10.847	12.120	-4.229	0.45	10^3 cyc	0.61	1.1	0.75	0.68	0.28	0.36	0.29	0.79	0.53	0.7
							10^8 cyc	1.22	0.79	0.72	1.8	1.28	1.2	1.82	1.27	1.61	1.3
#25	SSC:14	Disc. Cruciform Axial	14.721	16.960	-7.439	0.91	10^3 cyc	1.39	2.51	1.71	1.57	0.64	0.82	0.67	1.8	1.21	1.6
							10^8 cyc	0.86	0.56	0.51	1.27	0.91	0.85	1.28	0.9	1.13	0.92
#26	SSC:15	Loaded Edge Attachment Plate	9.566	10.830	-4.200	0.43	10^3 cyc	1.19	2.15	1.46	1.34	0.54	0.71	0.57	1.54	1.04	1.37
							10^8 cyc	2.42	1.57	1.43	3.58	2.55	2.4	3.62	2.53	3.2	2.59
#27	SSC:16	Partial Pen. Butt Weld	10.626	12.020	-4.631	0.58	10^3 cyc	1.01	1.82	1.24	1.14	0.46	0.6	0.49	1.31	0.88	1.17
							10^8 cyc	1.6	1.03	0.94	2.36	1.68	1.58	2.39	1.66	2.11	1.71
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	13.455	15.550	-6.960	0.95	10^3 cyc	1.61	2.9	1.97	1.81	0.74	0.95	0.78	2.08	1.4	1.86
							10^8 cyc	1.11	0.72	0.65	1.63	1.17	1.09	1.65	1.15	1.46	1.18
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	9.265	10.390	-3.736	0.34	10^3 cyc	0.89	1.6	1.09	1	0.4	0.53	0.43	1.15	0.77	1.02
							10^8 cyc	2.54	1.64	1.5	3.75	2.67	2.51	3.79	2.64	3.35	2.71
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	2.1	3.77	2.56	2.35	0.96	1.24	1.01	2.71	1.82	2.41
							10^8 cyc	1.21	0.78	0.71	1.78	1.27	1.19	1.8	1.26	1.59	1.29
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	9.097	10.140	-3.485	0.39	10^3 cyc	0.72	1.29	0.88	0.81	0.33	0.43	0.35	0.93	0.63	0.83
							10^8 cyc	2.61	1.69	1.54	3.86	2.75	2.59	3.91	2.72	3.45	2.8
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	2.1	3.77	2.56	2.35	0.96	1.24	1.01	2.71	1.82	2.41
							10^8 cyc	1.21	0.78	0.71	1.78	1.27	1.19	1.8	1.26	1.59	1.29
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	9.048	10.260	-4.027	0.65	10^3 cyc	1.36	2.44	1.66	1.52	0.62	0.8	0.65	1.75	1.18	1.56
							10^8 cyc	3.1	2.01	1.83	4.58	3.27	3.07	4.64	3.24	4.1	3.32
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	15.241	18.020	-9.233	0.75	10^3 cyc	2.68	4.82	3.28	3.01	1.22	1.58	1.29	3.46	2.33	3.08
							10^8 cyc	1.22	0.79	0.72	1.8	1.29	1.21	1.83	1.27	1.61	1.31
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	12.941	15.190	-7.472	0.93	10^3 cyc	2.46	4.42	3	2.76	1.12	1.45	1.18	3.17	2.13	2.83
							10^8 cyc	1.5	0.97	0.89	2.22	1.58	1.49	2.25	1.57	1.98	1.61

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #11	#12	#13	#14	#15	#16	#17	#18	#19	#20
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	13.566	15.830	-7.520	0.93	10^3 cyc	2.07	3.73	2.54	2.33	0.94	1.23	1	2.68	1.8	2.39
							10^8 cyc	1.26	0.81	0.74	1.85	1.32	1.24	1.88	1.31	1.66	1.34
#37	SSC:20	Plate Penetration: Axial	10.180	11.570	-4.619	0.66	10^3 cyc	1.25	2.25	1.53	1.41	0.57	0.74	0.6	1.62	1.09	1.44
							10^8 cyc	1.98	1.29	1.17	2.93	2.09	1.97	2.97	2.07	2.62	2.12
#38	SSC:20(S)	Plate Penetration: Shear	12.695	14.730	-6.759	0.93	10^3 cyc	1.87	3.36	2.28	2.1	0.85	1.1	0.9	2.41	1.62	2.15
							10^8 cyc	1.34	0.87	0.79	1.99	1.42	1.33	2.01	1.4	1.77	1.44
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	22.432	26.720	-14.245	0.62	10^3 cyc	2.9	5.21	3.54	3.25	1.32	1.71	1.4	3.74	2.52	3.33
							10^8 cyc	0.85	0.55	0.5	1.26	0.9	0.84	1.27	0.89	1.12	0.91
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	20.826	25.490	-15.494	0.62	10^3 cyc	4.9	8.81	6	5.5	2.23	2.9	2.36	6.33	4.26	5.64
							10^8 cyc	1.35	0.87	0.8	1.99	1.42	1.34	2.02	1.41	1.78	1.44
#41	SSC:21(S)	Plate Penetration: Shear	14.765	16.980	-7.358	0.83	10^3 cyc	1.32	2.37	1.61	1.48	0.6	0.78	0.63	1.7	1.14	1.52
							10^8 cyc	0.82	0.53	0.49	1.22	0.87	0.82	1.23	0.86	1.09	0.88
#42	SSC:22	Tee with Stud Attachment: Bndg	9.093	10.040	-3.147	0.32	10^3 cyc	0.47	0.84	0.57	0.52	0.21	0.28	0.22	0.6	0.41	0.54
							10^8 cyc	2.37	1.54	1.4	3.51	2.5	2.35	3.55	2.47	3.13	2.54
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.54	0.97	0.66	0.6	0.24	0.32	0.26	0.69	0.47	0.62
							10^8 cyc	2.61	1.69	1.54	3.85	2.75	2.58	3.9	2.72	3.44	2.79
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.54	0.97	0.66	0.6	0.24	0.32	0.26	0.69	0.47	0.62
							10^8 cyc	2.61	1.69	1.54	3.85	2.75	2.58	3.9	2.72	3.44	2.79
#45	SSC:25	Continuous Cruciform	13.656	15.790	-7.090	0.78	10^3 cyc	1.62	2.92	1.98	1.82	0.74	0.96	0.78	2.09	1.41	1.87
							10^8 cyc	1.08	0.7	0.64	1.59	1.14	1.07	1.61	1.12	1.42	1.15
#46	SSC:25A	Plate with Transv. Side Attachment	16.906	19.470	-8.518	0.91	10^3 cyc	1.28	2.31	1.57	1.44	0.58	0.76	0.62	1.66	1.12	1.48
							10^8 cyc	0.65	0.42	0.38	0.96	0.68	0.64	0.97	0.68	0.86	0.7
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	13.053	15.150	-6.966	0.63	10^3 cyc	1.85	3.33	2.26	2.08	0.84	1.09	0.89	2.39	1.61	2.13
							10^8 cyc	1.26	0.82	0.75	1.87	1.33	1.25	1.89	1.32	1.67	1.35
#48	SSC:26	Welded Cover Plate	9.122	10.130	-3.348	0.61	10^3 cyc	0.61	1.09	0.74	0.68	0.28	0.36	0.29	0.79	0.53	0.7
							10^8 cyc	2.48	1.61	1.47	3.66	2.61	2.46	3.71	2.59	3.27	2.65
#49	SSC:27	Double Lapped Plate with Plug Welds	8.453	9.400	-3.146	0.58	10^3 cyc	0.74	1.34	0.91	0.84	0.34	0.44	0.36	0.96	0.65	0.86
							10^8 cyc	3.79	2.46	2.24	5.6	3.99	3.75	5.66	3.95	5	4.05
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	10.471	12.060	-5.277	0.54	10^3 cyc	1.8	3.23	2.2	2.02	0.82	1.06	0.87	2.32	1.56	2.07
							10^8 cyc	2.09	1.35	1.23	3.08	2.2	2.07	3.12	2.18	2.75	2.23
#51	SSC:28	Baseplate with Circular Hole	15.078	17.410	-7.746	0.81	10^3 cyc	1.47	2.64	1.8	1.65	0.67	0.87	0.71	1.9	1.28	1.69
							10^8 cyc	0.85	0.55	0.5	1.26	0.9	0.84	1.27	0.89	1.12	0.91
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.919	9.870	-3.159	0.31	10^3 cyc	0.54	0.97	0.66	0.61	0.25	0.32	0.26	0.7	0.47	0.62
							10^8 cyc	2.7	1.75	1.6	4	2.85	2.68	4.04	2.82	3.57	2.89
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.566	10.580	-3.368	0.10	10^3 cyc	0.46	0.83	0.56	0.52	0.21	0.27	0.22	0.6	0.4	0.53
							10^8 cyc	1.84	1.19	1.09	2.72	1.94	1.82	2.75	1.92	2.43	1.97
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	9.361	10.670	-4.348	0.62	10^3 cyc	1.52	2.73	1.86	1.71	0.69	0.9	0.73	1.96	1.32	1.75
							10^8 cyc	2.81	1.82	1.66	4.15	2.96	2.78	4.2	2.93	3.71	3.01
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	9.091	10.130	-3.453	0.44	10^3 cyc	0.71	1.28	0.87	0.8	0.32	0.42	0.34	0.92	0.62	0.82
							10^8 cyc	2.61	1.69	1.55	3.86	2.76	2.59	3.91	2.73	3.45	2.8
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	9.566	10.830	-4.200	0.43	10^3 cyc	1.19	2.15	1.46	1.34	0.54	0.71	0.57	1.54	1.04	1.37
							10^8 cyc	2.42	1.57	1.43	3.58	2.55	2.4	3.62	2.53	3.2	2.59
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	8.646	9.710	-3.533	0.62	10^3 cyc	1.05	1.89	1.28	1.18	0.48	0.62	0.5	1.35	0.91	1.21
							10^8 cyc	3.57	2.32	2.11	5.28	3.77	3.54	5.34	3.73	4.72	3.82
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	8.758	9.860	-3.660	0.50	10^3 cyc	1.12	2.02	1.37	1.26	0.51	0.66	0.54	1.45	0.97	1.29
							10^8 cyc	3.41	2.21	2.02	5.04	3.6	3.38	5.1	3.56	4.51	3.65
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	16.469	19.590	-10.368	0.81	10^3 cyc	2.97	5.35	3.64	3.34	1.36	1.76	1.43	3.84	2.59	3.42
							10^8 cyc	1.18	0.77	0.7	1.75	1.25	1.17	1.77	1.23	1.56	1.27
#60	SSC:35	Butt Weld with Backing Bar	9.604	10.750	-3.808	0.28	10^3 cyc	0.78	1.41	0.96	0.88	0.36	0.46	0.38	1.01	0.68	0.9
							10^8 cyc	2.11	1.37	1.25	3.11	2.22	2.09	3.15	2.2	2.78	2.26
#61	SSC:36	Skip Welded Plates with Rathole	13.053	15.150	-6.966	0.63	10^3 cyc	1.85	3.33	2.26	2.08	0.84	1.09	0.89	2.39	1.61	2.13
							10^8 cyc	1.26	0.82	0.75	1.87	1.33	1.25	1.89	1.32	1.67	1.35
#62	SSC:36A	Skip Welded Plates	11.326	12.880	-5.163	0.46	10^3 cyc	1.13	2.04	1.39	1.27	0.52	0.67	0.55	1.47	0.99	1.31
							10^8 cyc	1.38	0.9	0.82	2.04	1.46	1.37	2.07	1.44	1.82	1.48
#63	SSC:38	Stiffener Plate Penetration: Bndg	9.128	10.170	-3.462	0.36	10^3 cyc	0.7	1.26	0.86	0.79	0.32	0.42	0.34	0.91	0.61	0.81
							10^8 cyc	2.56	1.66	1.51	3.78	2.7	2.53	3.82	2.67	3.38	2.74
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	14.312	17.390	-10.225	0.88	10^3 cyc	4.61	8.29	5.64	5.18	2.1	2.73	2.22	5.96	4.01	5.31
							10^8 cyc	1.86	1.21	1.1	2.75	1.96	1.84	2.78	1.94	2.46	1.99
#65	SSC:40	Stiffener Intersection: Bending	8.646	9.710	-3.533	0.62	10^3 cyc	1.05	1.89	1.28	1.18	0.48	0.62	0.5	1.35	0.91	1.21
							10^8 cyc	3.57	2.32	2.11	5.28	3.77	3.54	5.34	3.73	4.72	3.82
#66	SSC:42	Bending of Long Attachment	14.765	16.980	-7.358	0.83	10^3 cyc	1.32	2.37	1.61	1.48	0.6	0.78	0.63	1.7	1.14	1.52
							10^8 cyc	0.82	0.53	0.49	1.22	0.87	0.82	1.23	0.86	1.09	0.88
#67	SSC:46	Long. Welds on Support Gussets: Axial	9.361	10.670	-4.348	0.62	10^3 cyc	1.52	2.73	1.86	1.71	0.69	0.9	0.73	1.96	1.32	1.75
							10^8 cyc	2.81	1.82	1.66	4.15	2.96	2.78	4.2	2.93	3.71	3.01
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.781	10.930	-3.818	0.07	10^3 cyc	0.71	1.28	0.87	0.8	0.32	0.42	0.34	0.92	0.62	0.82
							10^8 cyc	1.9	1.23	1.12	2.81	2	1.88	2.84	1.98	2.51	2.03
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bnd	10.023	11.240	-4.042	0.19	10^3 cyc	0.79	1.42	0.97	0.89	0.36	0.47	0.38	1.02	0.69	0.91
							10^8 cyc	1.79	1.16	1.06	2.64	1.88	1.77	2.67	1.86	2.36	1.91
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.4	0.72	0.49	0.45	0.18	0.24	0.19	0.51	0.35	0.46
							10^8 cyc	2.42	1.57	1.43	3.58	2.55	2.4	3.62	2.52	3.19	2.59

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
#1	SSC:1(all steels)	Baseplate	13.825	15.550	-5.729	0.75	10^3 cyc	0.48	0.66	0.6	1.02	0.44	0.52	0.61	0.38	0.7	0.3
							10^8 cyc	0.48	0.36	0.58	0.5	0.71	0.25	0.38	0.55	0.24	0.5
#2	SSC:1M	Baseplate Mild Steel	21.679	25.360	-12.229	0.71	10^3 cyc	1.44	2	1.8	3.07	1.34	1.57	1.85	1.16	2.11	0.89
							10^8 cyc	0.5	0.37	0.6	0.52	0.73	0.26	0.39	0.57	0.25	0.52
#3	SSC:1H	Baseplate HSLA Steel	27.389	32.040	-15.449	0.91	10^3 cyc	1.4	1.95	1.75	2.99	1.31	1.53	1.8	1.13	2.06	0.87
							10^8 cyc	0.4	0.3	0.48	0.41	0.59	0.21	0.32	0.46	0.2	0.42
#4	SSC:1Q	Baseplate Q & T Steel	13.345	14.910	-5.199	0.68	10^3 cyc	0.37	0.51	0.46	0.78	0.34	0.4	0.47	0.3	0.54	0.23
							10^8 cyc	0.45	0.34	0.55	0.47	0.67	0.24	0.36	0.52	0.23	0.47
#5	SSC:1(F)	Baseplate Flame Cut	12.334	13.780	-4.805	0.60	10^3 cyc	0.4	0.55	0.5	0.85	0.37	0.43	0.51	0.32	0.58	0.25
							10^8 cyc	0.59	0.44	0.72	0.61	0.87	0.31	0.47	0.68	0.29	0.62
#6	SSC:2	Rolled I-Beam Bending	13.999	15.820	-6.048	0.64	10^3 cyc	0.57	0.79	0.71	1.22	0.53	0.62	0.73	0.46	0.84	0.35
							10^8 cyc	0.52	0.39	0.63	0.54	0.76	0.27	0.41	0.59	0.26	0.54
#7	SSC:3	Longitudinal Seam	13.010	14.800	-5.946	0.63	10^3 cyc	0.77	1.08	0.97	1.65	0.72	0.84	0.99	0.62	1.14	0.48
							10^8 cyc	0.73	0.55	0.88	0.75	1.07	0.38	0.57	0.83	0.36	0.76
#8	SSC:3(G)	Ground Long. Seam	13.602	15.520	-6.370	0.74	10^3 cyc	0.83	1.15	1.04	1.77	0.77	0.9	1.06	0.67	1.21	0.51
							10^8 cyc	0.68	0.51	0.83	0.71	1	0.36	0.54	0.78	0.34	0.71
#9	SSC:4	Long. Fillet Weld Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	0.77	1.07	0.96	1.64	0.72	0.84	0.99	0.62	1.13	0.48
							10^8 cyc	0.79	0.6	0.96	0.82	1.16	0.41	0.63	0.9	0.39	0.83
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	8.663	9.650	-3.278	0.48	10^3 cyc	0.58	0.82	0.73	1.25	0.55	0.64	0.75	0.47	0.86	0.36
							10^8 cyc	2.66	1.99	3.21	2.75	3.9	1.38	2.1	3.03	1.32	2.78
#11	SSC:6	Dbl I-Bm Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	0.77	1.07	0.96	1.64	0.72	0.84	0.99	0.62	1.13	0.48
							10^8 cyc	0.79	0.6	0.96	0.82	1.16	0.41	0.63	0.9	0.39	0.83
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	10.095	11.230	-3.771	0.53	10^3 cyc	0.43	0.59	0.53	0.91	0.4	0.47	0.55	0.34	0.63	0.27
							10^8 cyc	1.23	0.92	1.48	1.27	1.8	0.64	0.97	1.4	0.61	1.28
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	10.204	11.460	-4.172	0.51	10^3 cyc	0.63	0.87	0.79	1.34	0.59	0.69	0.81	0.51	0.92	0.39
							10^8 cyc	1.34	1.01	1.62	1.39	1.97	0.7	1.06	1.53	0.67	1.4
#14	SSC:8	Bolted Double Lap	14.469	16.440	-6.549	0.81	10^3 cyc	0.68	0.95	0.86	1.46	0.64	0.75	0.88	0.55	1	0.42
							10^8 cyc	0.54	0.4	0.65	0.56	0.79	0.28	0.42	0.61	0.27	0.56
#15	SSC:9	Riveted Single Lap	16.687	19.590	-9.643	0.90	10^3 cyc	1.68	2.35	2.11	3.6	1.57	1.84	2.16	1.36	2.47	1.05
							10^8 cyc	0.75	0.56	0.91	0.78	1.1	0.39	0.59	0.86	0.37	0.79
#16	SSC:10M	Butt Weld Axial:Mild Steel	14.345	16.630	-7.589	0.88	10^3 cyc	1.3	1.81	1.62	2.77	1.21	1.42	1.67	1.05	1.9	0.81
							10^8 cyc	0.8	0.6	0.97	0.83	1.18	0.42	0.63	0.91	0.4	0.84
#17	SSC:10H	Butt Weld Axial:HSLA Steel	22.068	25.920	-12.795	0.96	10^3 cyc	1.59	2.22	1.99	3.4	1.49	1.74	2.05	1.29	2.34	0.99
							10^8 cyc	0.53	0.4	0.64	0.55	0.78	0.28	0.42	0.61	0.26	0.55
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	12.108	13.650	-5.124	0.76	10^3 cyc	0.59	0.83	0.74	1.27	0.56	0.65	0.76	0.48	0.87	0.37
							10^8 cyc	0.76	0.57	0.92	0.79	1.12	0.4	0.6	0.87	0.38	0.8
#19	SSC:10(G)	Butt Weld Axial:Ground	14.784	16.930	-7.130	0.94	10^3 cyc	0.88	1.23	1.1	1.89	0.83	0.96	1.13	0.71	1.3	0.55
							10^8 cyc	0.6	0.45	0.73	0.62	0.88	0.31	0.47	0.69	0.3	0.63
#20	SSC:10A	Butt Weld Bndg	12.494	14.140	-5.468	0.79	10^3 cyc	0.67	0.93	0.83	1.42	0.62	0.73	0.86	0.54	0.98	0.41
							10^8 cyc	0.74	0.56	0.9	0.77	1.09	0.39	0.59	0.85	0.37	0.78
#21	SSC:11	I-Bm Butt Weld Bndg	12.035	13.770	-5.765	0.68	10^3 cyc	1	1.39	1.25	2.14	0.94	1.09	1.29	0.81	1.47	0.62
							10^8 cyc	1	0.75	1.21	1.04	1.47	0.52	0.79	1.14	0.5	1.04
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	10.366	11.690	-4.398	0.43	10^3 cyc	0.72	1	0.9	1.53	0.67	0.78	0.92	0.58	1.05	0.45
							10^8 cyc	1.33	1	1.61	1.38	1.96	0.69	1.05	1.52	0.66	1.39
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	12.415	14.120	-5.663	0.60	10^3 cyc	0.8	1.11	1	1.71	0.75	0.87	1.03	0.65	1.17	0.5
							10^8 cyc	0.83	0.62	1	0.86	1.21	0.43	0.65	0.94	0.41	0.86
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	10.847	12.120	-4.229	0.45	10^3 cyc	0.47	0.65	0.59	1	0.44	0.51	0.6	0.38	0.69	0.29
							10^8 cyc	0.97	0.72	1.17	1	1.42	0.5	0.76	1.1	0.48	1.01
#25	SSC:14	Disc. Cruciform Axial	14.721	16.960	-7.439	0.91	10^3 cyc	1.07	1.49	1.34	2.29	1	1.17	1.38	0.86	1.57	0.67
							10^8 cyc	0.68	0.51	0.82	0.71	1	0.35	0.54	0.78	0.34	0.71
#26	SSC:15	Loaded Edge Attachment Plate	9.566	10.830	-4.200	0.43	10^3 cyc	0.91	1.28	1.15	1.96	0.86	1	1.18	0.74	1.34	0.57
							10^8 cyc	1.93	1.44	2.33	1.99	2.82	1	1.52	2.19	0.96	2.01
#27	SSC:16	Partial Pen. Butt Weld	10.626	12.020	-4.631	0.58	10^3 cyc	0.78	1.08	0.97	1.66	0.73	0.85	1	0.63	1.14	0.48
							10^8 cyc	1.27	0.95	1.53	1.31	1.86	0.66	1	1.44	0.63	1.32
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	13.455	15.550	-6.960	0.95	10^3 cyc	1.24	1.72	1.55	2.65	1.16	1.35	1.59	1	1.82	0.77
							10^8 cyc	0.88	0.66	1.06	0.91	1.29	0.46	0.69	1	0.44	0.92
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	9.265	10.390	-3.736	0.34	10^3 cyc	0.68	0.95	0.85	1.46	0.64	0.74	0.88	0.55	1	0.42
							10^8 cyc	2.01	1.51	2.43	2.09	2.95	1.05	1.59	2.29	1	2.1
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	1.61	2.24	2.01	3.44	1.5	1.76	2.07	1.3	2.36	1
							10^8 cyc	0.96	0.72	1.16	0.99	1.4	0.5	0.76	1.09	0.48	1
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	9.097	10.140	-3.465	0.39	10^3 cyc	0.55	0.77	0.69	1.18	0.52	0.6	0.71	0.45	0.81	0.34
							10^8 cyc	2.08	1.56	2.51	2.15	3.04	1.08	1.64	2.36	1.03	2.17
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	1.61	2.24	2.01	3.44	1.5	1.76	2.07	1.3	2.36	1
							10^8 cyc	0.96	0.72	1.16	0.99	1.4	0.5	0.76	1.09	0.48	1
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	9.048	10.260	-4.027	0.65	10^3 cyc	1.04	1.45	1.3	2.23	0.97	1.14	1.34	0.84	1.53	0.65
							10^8 cyc	2.46	1.85	2.98	2.55	3.61	1.28	1.94	2.81	1.22	2.57
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	15.241	18.020	-9.233	0.75	10^3 cyc	2.05	2.86	2.57	4.39	1.92	2.24	2.64	1.66	3.02	1.28
							10^8 cyc	0.97	0.73	1.17	1	1.42	0.5	0.77	1.1	0.48	1.01
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	12.941	15.190	-7.472	0.93	10^3 cyc	1.88	2.63	2.36	4.03	1.76	2.06	2.42	1.52	2.77	1.17
							10^8 cyc	1.19	0.89	1.44	1.24	1.75	0.62	0.94	1.36	0.59	1.25

Header spanning columns #21–#30: RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE)

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE)									
								#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	13.566	15.830	-7.520	0.93	10^3 cyc	1.59	2.22	1.99	3.4	1.49	1.74	2.04	1.28	2.33	0.99
							10^8 cyc	1	0.75	1.21	1.03	1.46	0.52	0.79	1.14	0.5	1.04
#37	SSC:20	Plate Penetration: Axial	10.180	11.570	-4.619	0.66	10^3 cyc	0.96	1.34	1.2	2.05	0.9	1.05	1.24	0.78	1.41	0.6
							10^8 cyc	1.58	1.18	1.91	1.63	2.31	0.82	1.24	1.8	0.78	1.65
#38	SSC:20(S)	Plate Penetration: Shear	12.695	14.730	-6.759	0.93	10^3 cyc	1.43	2	1.79	3.06	1.34	1.57	1.84	1.16	2.1	0.89
							10^8 cyc	1.07	0.8	1.29	1.1	1.56	0.55	0.84	1.22	0.53	1.11
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	22.432	26.720	-14.245	0.62	10^3 cyc	2.22	3.1	2.78	4.75	2.08	2.43	2.86	1.8	3.26	1.38
							10^8 cyc	0.68	0.51	0.82	0.7	0.99	0.35	0.53	0.77	0.34	0.71
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	20.826	25.490	-15.494	0.62	10^3 cyc	3.76	5.24	4.71	8.03	3.51	4.11	4.83	3.04	5.52	2.34
							10^8 cyc	1.07	0.8	1.3	1.11	1.57	0.56	0.85	1.22	0.53	1.12
#41	SSC:21(S)	Plate Penetration: Shear	14.765	16.980	-7.358	0.83	10^3 cyc	1.01	1.41	1.26	2.16	0.94	1.1	1.3	0.82	1.48	0.63
							10^8 cyc	0.65	0.49	0.79	0.68	0.96	0.34	0.52	0.75	0.33	0.68
#42	SSC:22	Tee with Stud Attachment: Bndg	9.093	10.040	-3.147	0.32	10^3 cyc	0.36	0.5	0.45	0.77	0.33	0.39	0.46	0.29	0.53	0.22
							10^8 cyc	1.88	1.41	2.28	1.95	2.76	0.98	1.49	2.15	0.94	1.97
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.41	0.57	0.52	0.88	0.39	0.45	0.53	0.33	0.6	0.26
							10^8 cyc	2.07	1.55	2.5	2.14	3.04	1.08	1.63	2.36	1.03	2.18
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.41	0.57	0.52	0.88	0.39	0.45	0.53	0.33	0.6	0.26
							10^8 cyc	2.07	1.55	2.5	2.14	3.04	1.08	1.63	2.36	1.03	2.16
#45	SSC:25	Continuous Cruciform	13.656	15.790	-7.090	0.78	10^3 cyc	1.24	1.73	1.56	2.66	1.16	1.36	1.6	1	1.83	0.77
							10^8 cyc	0.86	0.64	1.03	0.89	1.25	0.44	0.68	0.97	0.42	0.89
#46	SSC:25A	Plate with Transv. Side Attachment	16.906	19.470	-8.518	0.91	10^3 cyc	0.98	1.37	1.23	2.1	0.92	1.08	1.27	0.8	1.44	0.61
							10^8 cyc	0.52	0.39	0.62	0.53	0.76	0.27	0.41	0.59	0.26	0.54
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	13.053	15.150	-6.966	0.63	10^3 cyc	1.42	1.98	1.78	3.03	1.33	1.55	1.82	1.15	2.08	0.88
							10^8 cyc	1	0.75	1.21	1.04	1.47	0.52	0.79	1.14	0.5	1.05
#48	SSC:26	Welded Cover Plate	9.122	10.130	-3.348	0.61	10^3 cyc	0.47	0.65	0.58	1	0.44	0.51	0.6	0.38	0.68	0.29
							10^8 cyc	1.97	1.48	2.38	2.04	2.89	1.02	1.55	2.24	0.98	2.06
#49	SSC:27	Double Lapped Plate with Plug Welds	8.453	9.400	-3.146	0.58	10^3 cyc	0.57	0.8	0.71	1.22	0.53	0.62	0.73	0.46	0.84	0.36
							10^8 cyc	3.01	2.26	3.64	3.12	4.41	1.56	2.37	3.43	1.49	3.14
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	10.471	12.060	-5.277	0.54	10^3 cyc	1.38	1.92	1.73	2.95	1.29	1.51	1.77	1.11	2.02	0.86
							10^8 cyc	1.66	1.24	2	1.72	2.43	0.86	1.31	1.89	0.82	1.73
#51	SSC:28	Baseplate with Circular Hole	15.078	17.410	-7.746	0.81	10^3 cyc	1.13	1.57	1.41	2.41	1.05	1.23	1.45	0.91	1.65	0.7
							10^8 cyc	0.68	0.51	0.82	0.7	0.99	0.35	0.53	0.77	0.34	0.71
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.919	9.870	-3.159	0.31	10^3 cyc	0.41	0.58	0.52	0.88	0.39	0.45	0.53	0.33	0.61	0.26
							10^8 cyc	2.15	1.61	2.6	2.22	3.15	1.12	1.69	2.45	1.07	2.24
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.566	10.580	-3.368	0.10	10^3 cyc	0.35	0.49	0.44	0.76	0.33	0.39	0.45	0.29	0.52	0.22
							10^8 cyc	1.46	1.1	1.77	1.51	2.15	0.76	1.15	1.67	0.73	1.53
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	9.361	10.670	-4.348	0.62	10^3 cyc	1.16	1.62	1.46	2.49	1.09	1.27	1.5	0.94	1.71	0.72
							10^8 cyc	2.23	1.67	2.7	2.31	3.27	1.16	1.76	2.54	1.11	2.33
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	9.091	10.130	-3.453	0.44	10^3 cyc	0.55	0.76	0.68	1.17	0.51	0.6	0.7	0.44	0.8	0.34
							10^8 cyc	2.08	1.56	2.51	2.15	3.04	1.08	1.64	2.36	1.03	2.17
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	9.566	10.830	-4.200	0.43	10^3 cyc	0.91	1.28	1.15	1.96	0.86	1	1.18	0.74	1.34	0.57
							10^8 cyc	1.93	1.44	2.33	1.99	2.82	1	1.52	2.19	0.96	2.01
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	8.646	9.710	-3.533	0.62	10^3 cyc	0.8	1.12	1.01	1.72	0.75	0.88	1.03	0.65	1.18	0.5
							10^8 cyc	2.84	2.13	3.43	2.94	4.16	1.47	2.24	3.23	1.41	2.96
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	8.758	9.860	-3.660	0.50	10^3 cyc	0.86	1.2	1.08	1.84	0.8	0.94	1.11	0.69	1.26	0.53
							10^8 cyc	2.71	2.03	3.28	2.81	3.97	1.41	2.14	3.09	1.35	2.83
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	16.469	19.590	-10.368	0.81	10^3 cyc	2.28	3.18	2.86	4.87	2.13	2.49	2.93	1.84	3.35	1.42
							10^8 cyc	0.94	0.7	1.14	0.97	1.38	0.49	0.74	1.07	0.47	0.98
#60	SSC:35	Butt Weld with Backing Bar	9.604	10.750	-3.808	0.28	10^3 cyc	0.6	0.84	0.75	1.28	0.56	0.66	0.77	0.48	0.88	0.37
							10^8 cyc	1.67	1.25	2.02	1.73	2.45	0.87	1.32	1.91	0.83	1.75
#61	SSC:36	Skip Welded Plates with Rathole	13.053	15.150	-6.966	0.63	10^3 cyc	1.42	1.98	1.78	3.03	1.33	1.55	1.82	1.15	2.08	0.88
							10^8 cyc	1	0.75	1.21	1.04	1.47	0.52	0.79	1.14	0.5	1.05
#62	SSC:36A	Skip Welded Plates	11.326	12.880	-5.163	0.46	10^3 cyc	0.87	1.21	1.09	1.86	0.81	0.95	1.12	0.7	1.28	0.54
							10^8 cyc	1.1	0.82	1.33	1.14	1.61	0.57	0.87	1.25	0.54	1.15
#63	SSC:38	Stiffener Plate Penetration: Bndg	9.128	10.170	-3.462	0.36	10^3 cyc	0.54	0.75	0.67	1.15	0.5	0.59	0.69	0.43	0.79	0.33
							10^8 cyc	2.03	1.52	2.45	2.1	2.98	1.06	1.6	2.31	1.01	2.12
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	14.312	17.390	-10.225	0.88	10^3 cyc	3.54	4.93	4.43	7.56	3.31	3.87	4.55	2.86	5.19	2.2
							10^8 cyc	1.48	1.11	1.79	1.53	2.17	0.77	1.17	1.69	0.73	1.54
#65	SSC:40	Stiffener Intersection: Bending	8.646	9.710	-3.533	0.62	10^3 cyc	0.8	1.12	1.01	1.72	0.75	0.88	1.03	0.65	1.18	0.5
							10^8 cyc	2.84	2.13	3.43	2.94	4.16	1.47	2.24	3.23	1.41	2.96
#66	SSC:42	Bending of Long Attachment	14.765	16.980	-7.358	0.83	10^3 cyc	1.01	1.41	1.26	2.16	0.94	1.1	1.3	0.82	1.48	0.63
							10^8 cyc	0.65	0.49	0.79	0.68	0.96	0.34	0.52	0.75	0.33	0.68
#67	SSC:46	Long. Welds on Support Gussets: Axial	9.361	10.670	-4.348	0.62	10^3 cyc	1.16	1.62	1.46	2.49	1.09	1.27	1.5	0.94	1.71	0.72
							10^8 cyc	2.23	1.67	2.7	2.31	3.27	1.16	1.76	2.54	1.11	2.33
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.781	10.930	-3.818	0.07	10^3 cyc	0.55	0.76	0.68	1.17	0.51	0.6	0.7	0.44	0.8	0.34
							10^8 cyc	1.51	1.13	1.82	1.56	2.21	0.78	1.19	1.72	0.75	1.58
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bnd	10.023	11.240	-4.042	0.19	10^3 cyc	0.61	0.84	0.76	1.3	0.57	0.66	0.78	0.49	0.89	0.38
							10^8 cyc	1.42	1.06	1.71	1.47	2.08	0.74	1.12	1.62	0.7	1.48
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.31	0.43	0.38	0.65	0.29	0.33	0.39	0.25	0.45	0.19
							10^8 cyc	1.92	1.44	2.32	1.99	2.82	1	1.52	2.19	0.95	2.01

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	#31	#32	#33	#34	#35	#36	#37	#38	#39	#40
								RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE)									
#1	SSC:1(all steels)	Baseplate	13.825	15.550	-5.729	0.75	10^3 cyc	0.86	0.3	0.46	0.23	0.25	0.3	0.49	0.33	0.21	0.13
							10^8 cyc	0.23	0.5	0.2	0.5	0.4	0.48	0.31	0.45	0.71	0.45
#2	SSC:1M	Baseplate Mild Steel	21.679	25.360	-12.229	0.71	10^3 cyc	2.6	0.89	1.38	0.7	0.76	0.9	1.49	1	0.65	0.38
							10^8 cyc	0.24	0.52	0.2	0.52	0.42	0.5	0.32	0.47	0.74	0.47
#3	SSC:1H	Baseplate HSLA Steel	27.389	32.040	-15.449	0.91	10^3 cyc	2.54	0.87	1.35	0.68	0.74	0.88	1.46	0.98	0.63	0.37
							10^8 cyc	0.19	0.42	0.16	0.41	0.34	0.4	0.25	0.38	0.59	0.37
#4	SSC:1Q	Baseplate Q & T Steel	13.345	14.910	-5.199	0.68	10^3 cyc	0.66	0.23	0.35	0.18	0.19	0.23	0.38	0.26	0.16	0.1
							10^8 cyc	0.22	0.47	0.18	0.47	0.38	0.46	0.29	0.43	0.67	0.42
#5	SSC:1(F)	Baseplate Flame Cut	12.334	13.780	-4.805	0.60	10^3 cyc	0.72	0.25	0.38	0.19	0.21	0.25	0.41	0.28	0.18	0.11
							10^8 cyc	0.29	0.62	0.24	0.61	0.5	0.59	0.38	0.56	0.88	0.55
#6	SSC:2	Rolled I-Beam Bending	13.999	15.820	-6.048	0.64	10^3 cyc	1.03	0.35	0.55	0.28	0.3	0.36	0.59	0.4	0.26	0.15
							10^8 cyc	0.25	0.54	0.21	0.53	0.43	0.52	0.33	0.49	0.77	0.48
#7	SSC:3	Longitudinal Seam	13.010	14.800	-5.946	0.63	10^3 cyc	1.4	0.48	0.74	0.38	0.41	0.49	0.8	0.54	0.35	0.21
							10^8 cyc	0.35	0.76	0.3	0.75	0.61	0.73	0.46	0.68	1.08	0.68
#8	SSC:3(G)	Ground Long. Seam	13.602	15.520	-6.370	0.74	10^3 cyc	1.5	0.51	0.79	0.4	0.44	0.52	0.86	0.58	0.37	0.22
							10^8 cyc	0.33	0.71	0.28	0.7	0.57	0.69	0.43	0.64	1.01	0.64
#9	SSC:4	Long. Fillet Weld Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	1.39	0.48	0.74	0.37	0.41	0.48	0.8	0.54	0.35	0.2
							10^8 cyc	0.38	0.83	0.32	0.82	0.67	0.8	0.5	0.74	1.17	0.74
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	8.663	9.650	-3.278	0.48	10^3 cyc	1.06	0.36	0.56	0.28	0.31	0.37	0.61	0.41	0.26	0.16
							10^8 cyc	1.28	2.78	1.08	2.74	2.23	2.67	1.69	2.49	3.93	2.48
#11	SSC:6	Dbl I-Bm Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	1.39	0.48	0.74	0.37	0.41	0.48	0.8	0.54	0.35	0.2
							10^8 cyc	0.38	0.83	0.32	0.82	0.67	0.8	0.5	0.74	1.17	0.74
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	10.095	11.230	-3.771	0.53	10^3 cyc	0.77	0.27	0.41	0.21	0.23	0.27	0.44	0.3	0.19	0.11
							10^8 cyc	0.59	1.28	0.5	1.26	1.03	1.23	0.78	1.15	1.81	1.14
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	10.204	11.460	-4.172	0.51	10^3 cyc	1.14	0.39	0.6	0.31	0.33	0.39	0.65	0.44	0.28	0.17
							10^8 cyc	0.65	1.4	0.55	1.39	1.13	1.35	0.85	1.26	1.99	1.25
#14	SSC:8	Bolted Double Lap	14.469	16.440	-6.549	0.81	10^3 cyc	1.24	0.42	0.66	0.33	0.36	0.43	0.71	0.48	0.31	0.18
							10^8 cyc	0.26	0.56	0.22	0.55	0.45	0.54	0.34	0.5	0.79	0.5
#15	SSC:9	Riveted Single Lap	16.687	19.590	-9.643	0.90	10^3 cyc	3.05	1.05	1.62	0.82	0.89	1.06	1.75	1.17	0.76	0.45
							10^8 cyc	0.36	0.79	0.31	0.78	0.63	0.76	0.48	0.71	1.11	0.7
#16	SSC:10M	Butt Weld Axial:Mild Steel	14.345	16.630	-7.589	0.88	10^3 cyc	2.35	0.81	1.25	0.63	0.69	0.82	1.35	0.91	0.58	0.35
							10^8 cyc	0.39	0.84	0.33	0.83	0.67	0.8	0.51	0.75	1.19	0.75
#17	SSC:10H	Butt Weld Axial:HSLA Steel	22.068	25.920	-12.795	0.96	10^3 cyc	2.89	0.99	1.53	0.78	0.85	1	1.66	1.11	0.72	0.42
							10^8 cyc	0.26	0.55	0.22	0.55	0.45	0.53	0.34	0.5	0.79	0.5
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	12.108	13.650	-5.124	0.76	10^3 cyc	1.08	0.37	0.57	0.29	0.32	0.37	0.62	0.41	0.27	0.16
							10^8 cyc	0.37	0.8	0.31	0.79	0.64	0.76	0.48	0.71	1.13	0.71
#19	SSC:10(G)	Butt Weld Axial:Ground	14.784	16.930	-7.130	0.94	10^3 cyc	1.6	0.55	0.85	0.43	0.47	0.55	0.92	0.62	0.4	0.23
							10^8 cyc	0.29	0.63	0.24	0.62	0.5	0.6	0.38	0.56	0.89	0.56
#20	SSC:10A	Butt Weld Bndg	12.494	14.140	-5.468	0.79	10^3 cyc	1.21	0.41	0.64	0.32	0.35	0.42	0.69	0.47	0.3	0.18
							10^8 cyc	0.36	0.78	0.3	0.77	0.62	0.74	0.47	0.7	1.1	0.69
#21	SSC:11	I-Bm Butt Weld Bndg	12.035	13.770	-5.765	0.68	10^3 cyc	1.81	0.62	0.96	0.49	0.53	0.63	1.04	0.7	0.45	0.27
							10^8 cyc	0.48	1.04	0.41	1.03	0.84	1	0.63	0.94	1.48	0.93
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	10.366	11.690	-4.398	0.43	10^3 cyc	1.3	0.45	0.69	0.35	0.38	0.45	0.75	0.5	0.32	0.19
							10^8 cyc	0.64	1.39	0.54	1.38	1.12	1.34	0.85	1.25	1.97	1.24
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	12.415	14.120	-5.663	0.60	10^3 cyc	1.45	0.5	0.77	0.39	0.42	0.5	0.83	0.56	0.36	0.21
							10^8 cyc	0.4	0.86	0.34	0.85	0.69	0.83	0.52	0.78	1.22	0.77
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	10.847	12.120	-4.229	0.45	10^3 cyc	0.85	0.29	0.45	0.23	0.25	0.29	0.49	0.33	0.21	0.12
							10^8 cyc	0.47	1.01	0.39	1	0.81	0.97	0.61	0.91	1.43	0.9
#25	SSC:14	Disc. Cruciform Axial	14.721	16.960	-7.439	0.91	10^3 cyc	1.94	0.67	1.03	0.52	0.57	0.67	1.11	0.75	0.48	0.28
							10^8 cyc	0.33	0.71	0.28	0.7	0.57	0.68	0.43	0.64	1.01	0.64
#26	SSC:15	Loaded Edge Attachment Plate	9.566	10.830	-4.200	0.43	10^3 cyc	1.66	0.57	0.88	0.45	0.49	0.58	0.95	0.64	0.41	0.24
							10^8 cyc	0.93	2.01	0.78	1.98	1.61	1.93	1.22	1.8	2.85	1.8
#27	SSC:16	Partial Pen. Butt Weld	10.626	12.020	-4.631	0.58	10^3 cyc	1.41	0.48	0.75	0.38	0.41	0.49	0.81	0.54	0.35	0.21
							10^8 cyc	0.61	1.32	0.51	1.31	1.06	1.27	0.8	1.19	1.87	1.18
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	13.455	15.550	-6.960	0.95	10^3 cyc	2.24	0.77	1.19	0.6	0.66	0.78	1.29	0.86	0.56	0.33
							10^8 cyc	0.42	0.92	0.36	0.91	0.74	0.88	0.56	0.82	1.3	0.82
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	9.265	10.390	-3.736	0.34	10^3 cyc	1.24	0.42	0.65	0.33	0.36	0.43	0.71	0.48	0.31	0.18
							10^8 cyc	0.97	2.1	0.82	2.08	1.69	2.02	1.28	1.89	2.98	1.88
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	2.92	1	1.54	0.78	0.85	1.01	1.67	1.12	0.72	0.43
							10^8 cyc	0.46	1	0.39	0.99	0.8	0.96	0.61	0.9	1.42	0.89
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	9.097	10.140	-3.465	0.39	10^3 cyc	1	0.34	0.53	0.27	0.29	0.35	0.57	0.39	0.25	0.15
							10^8 cyc	1	2.17	0.84	2.14	1.74	2.08	1.32	1.94	3.07	1.94
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	2.92	1	1.54	0.78	0.85	1.01	1.67	1.12	0.72	0.43
							10^8 cyc	0.46	1	0.39	0.99	0.8	0.96	0.61	0.9	1.42	0.89
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	9.048	10.260	-4.027	0.65	10^3 cyc	1.89	0.65	1	0.51	0.55	0.66	1.08	0.73	0.47	0.28
							10^8 cyc	1.19	2.57	1	2.54	2.07	2.47	1.56	2.31	3.64	2.3
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	15.241	18.020	-9.233	0.75	10^3 cyc	3.72	1.28	1.97	1	1.09	1.29	2.14	1.43	0.92	0.55
							10^8 cyc	0.47	1.01	0.39	1	0.81	0.97	0.62	0.91	1.43	0.9
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	12.941	15.190	-7.472	0.93	10^3 cyc	3.42	1.17	1.81	0.92	1	1.16	1.96	1.32	0.85	0.5
							10^8 cyc	0.57	1.25	0.48	1.23	1	1.2	0.76	1.12	1.76	1.11

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #31	#32	#33	#34	#35	#36	#37	#38	#39	#40
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	13.566	15.830	-7.520	0.93	10^3 cyc	2.88	0.99	1.53	0.77	0.84	1	1.65	1.11	0.72	0.42
							10^8 cyc	0.48	1.04	0.4	1.03	0.84	1	0.63	0.93	1.47	0.93
#37	SSC:20	Plate Penetration: Axial	10.180	11.570	-4.619	0.66	10^3 cyc	1.74	0.6	0.92	0.47	0.51	0.6	1	0.67	0.43	0.26
							10^8 cyc	0.76	1.65	0.64	1.63	1.32	1.58	1	1.48	2.33	1.47
#38	SSC:20(S)	Plate Penetration: Shear	12.695	14.730	-6.759	0.93	10^3 cyc	2.6	0.89	1.38	0.7	0.76	0.9	1.49	1	0.64	0.38
							10^8 cyc	0.51	1.11	0.43	1.1	0.89	1.07	0.68	1	1.58	1
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	22.432	26.720	-14.245	0.62	10^3 cyc	4.03	1.38	2.13	1.08	1.18	1.4	2.31	1.55	1	0.59
							10^8 cyc	0.33	0.71	0.27	0.7	0.57	0.68	0.43	0.63	1	0.63
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	20.826	25.490	-15.494	0.62	10^3 cyc	6.82	2.34	3.61	1.83	2	2.36	3.91	2.62	1.69	1
							10^8 cyc	0.52	1.12	0.44	1.11	0.9	1.08	0.68	1	1.58	1
#41	SSC:21(S)	Plate Penetration: Shear	14.765	16.980	-7.358	0.83	10^3 cyc	1.83	0.63	0.97	0.49	0.54	0.64	1.05	0.7	0.45	0.27
							10^8 cyc	0.32	0.68	0.27	0.68	0.55	0.66	0.42	0.61	0.97	0.61
#42	SSC:22	Tee with Stud Attachment: Bndg	9.093	10.040	-3.147	0.32	10^3 cyc	0.65	0.22	0.34	0.17	0.19	0.23	0.37	0.25	0.16	0.1
							10^8 cyc	0.91	1.97	0.76	1.94	1.58	1.89	1.2	1.77	2.79	1.76
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.75	0.26	0.4	0.2	0.22	0.26	0.43	0.29	0.19	0.11
							10^8 cyc	1	2.16	0.84	2.14	1.74	2.08	1.31	1.94	3.06	1.93
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.75	0.26	0.4	0.2	0.22	0.26	0.43	0.29	0.19	0.11
							10^8 cyc	1	2.16	0.84	2.14	1.74	2.08	1.31	1.94	3.06	1.93
#45	SSC:25	Continuous Cruciform	13.656	15.790	-7.090	0.78	10^3 cyc	2.25	0.77	1.19	0.61	0.66	0.78	1.29	0.87	0.56	0.33
							10^8 cyc	0.41	0.89	0.35	0.88	0.72	0.86	0.54	0.8	1.26	0.8
#46	SSC:25A	Plate with Transv. Side Attachment	16.906	19.470	-8.518	0.91	10^3 cyc	1.78	0.61	0.95	0.48	0.52	0.62	1.02	0.69	0.44	0.26
							10^8 cyc	0.25	0.54	0.21	0.53	0.43	0.52	0.33	0.48	0.76	0.48
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	13.053	15.150	-6.966	0.63	10^3 cyc	2.57	0.88	1.36	0.69	0.75	0.89	1.48	0.99	0.64	0.38
							10^8 cyc	0.48	1.05	0.41	1.04	0.84	1.01	0.64	0.94	1.49	0.94
#48	SSC:26	Welded Cover Plate	9.122	10.130	-3.348	0.61	10^3 cyc	0.85	0.29	0.45	0.23	0.25	0.29	0.49	0.33	0.21	0.12
							10^8 cyc	0.95	2.06	0.8	2.03	1.65	1.98	1.25	1.85	2.91	1.84
#49	SSC:27	Double Lapped Plate with Plug Welds	8.453	9.400	-3.146	0.58	10^3 cyc	1.04	0.36	0.55	0.28	0.3	0.36	0.59	0.4	0.26	0.15
							10^8 cyc	1.45	3.14	1.22	3.1	2.52	3.02	1.91	2.82	4.45	2.81
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	10.471	12.060	-5.277	0.54	10^3 cyc	2.5	0.86	1.32	0.67	0.73	0.87	1.43	0.96	0.62	0.37
							10^8 cyc	0.8	1.73	0.67	1.71	1.39	1.66	1.05	1.55	2.45	1.55
#51	SSC:28	Baseplate with Circular Hole	15.078	17.410	-7.746	0.81	10^3 cyc	2.04	0.7	1.08	0.55	0.6	0.71	1.17	0.79	0.51	0.3
							10^8 cyc	0.33	0.71	0.27	0.7	0.57	0.68	0.43	0.63	1	0.63
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.919	9.870	-3.159	0.31	10^3 cyc	0.75	0.26	0.4	0.2	0.22	0.26	0.43	0.29	0.19	0.11
							10^8 cyc	1.03	2.24	0.87	2.21	1.8	2.15	1.36	2.01	3.18	2
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.566	10.580	-3.368	0.10	10^3 cyc	0.64	0.22	0.34	0.17	0.19	0.22	0.37	0.25	0.16	0.09
							10^8 cyc	0.71	1.53	0.59	1.51	1.23	1.47	0.93	1.37	2.16	1.36
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	9.361	10.670	-4.348	0.62	10^3 cyc	2.11	0.72	1.12	0.57	0.62	0.73	1.21	0.81	0.52	0.31
							10^8 cyc	1.08	2.33	0.91	2.3	1.87	2.24	1.42	2.09	3.3	2.08
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	9.091	10.130	-3.453	0.44	10^3 cyc	0.99	0.34	0.52	0.27	0.29	0.34	0.57	0.38	0.25	0.15
							10^8 cyc	1	2.17	0.84	2.14	1.74	2.08	1.32	1.95	3.07	1.94
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	9.566	10.830	-4.200	0.43	10^3 cyc	1.66	0.57	0.88	0.45	0.49	0.58	0.95	0.64	0.41	0.24
							10^8 cyc	0.93	2.01	0.78	1.98	1.61	1.93	1.22	1.8	2.85	1.8
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	8.646	9.710	-3.533	0.62	10^3 cyc	1.46	0.5	0.77	0.39	0.43	0.51	0.84	0.56	0.36	0.21
							10^8 cyc	1.37	2.96	1.15	2.93	2.38	2.85	1.8	2.66	4.2	2.65
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	8.758	9.860	-3.660	0.50	10^3 cyc	1.56	0.53	0.83	0.42	0.46	0.54	0.89	0.6	0.39	0.23
							10^8 cyc	1.31	2.83	1.1	2.8	2.27	2.72	1.72	2.54	4.01	2.53
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	16.469	19.590	-10.368	0.81	10^3 cyc	4.14	1.42	2.19	1.11	1.21	1.43	2.37	1.59	1.03	0.61
							10^8 cyc	0.45	0.98	0.38	0.97	0.79	0.94	0.6	0.88	1.39	0.88
#60	SSC:35	Butt Weld with Backing Bar	9.604	10.750	-3.808	0.28	10^3 cyc	1.09	0.37	0.58	0.29	0.32	0.38	0.62	0.42	0.27	0.16
							10^8 cyc	0.81	1.75	0.68	1.73	1.4	1.68	1.06	1.57	2.48	1.56
#61	SSC:36	Skip Welded Plates with Rathole	13.053	15.150	-6.966	0.63	10^3 cyc	2.57	0.88	1.36	0.69	0.75	0.89	1.48	0.99	0.64	0.38
							10^8 cyc	0.48	1.05	0.41	1.04	0.84	1.01	0.64	0.94	1.49	0.94
#62	SSC:36A	Skip Welded Plates	11.326	12.880	-5.163	0.46	10^3 cyc	1.58	0.54	0.84	0.42	0.46	0.55	0.91	0.61	0.39	0.23
							10^8 cyc	0.53	1.15	0.45	1.13	0.92	1.1	0.7	1.03	1.62	1.02
#63	SSC:38	Stiffener Plate Penetration: Bndg	9.128	10.170	-3.462	0.36	10^3 cyc	0.98	0.33	0.52	0.26	0.29	0.34	0.56	0.38	0.24	0.14
							10^8 cyc	0.98	2.12	0.82	2.09	1.7	2.04	1.29	1.9	3	1.89
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	14.312	17.390	-10.225	0.88	10^3 cyc	6.41	2.2	3.4	1.72	1.88	2.22	3.68	2.47	1.59	0.94
							10^8 cyc	0.71	1.54	0.6	1.53	1.24	1.48	0.94	1.39	2.19	1.38
#65	SSC:40	Stiffener Intersection: Bending	8.646	9.710	-3.533	0.62	10^3 cyc	1.46	0.5	0.77	0.39	0.43	0.51	0.84	0.56	0.36	0.21
							10^8 cyc	1.37	2.96	1.15	2.93	2.38	2.85	1.8	2.66	4.2	2.65
#66	SSC:42	Bending of Long Attachment	14.765	16.980	-7.358	0.83	10^3 cyc	1.83	0.63	0.97	0.49	0.54	0.64	1.05	0.7	0.45	0.27
							10^8 cyc	0.32	0.68	0.27	0.68	0.55	0.66	0.42	0.61	0.97	0.61
#67	SSC:46	Long. Welds on Support Gussets: Axial	9.361	10.670	-4.348	0.62	10^3 cyc	2.11	0.72	1.12	0.57	0.62	0.73	1.21	0.81	0.52	0.31
							10^8 cyc	1.08	2.33	0.91	2.3	1.87	2.24	1.42	2.09	3.3	2.08
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.781	10.930	-3.816	0.07	10^3 cyc	0.99	0.34	0.52	0.27	0.29	0.34	0.57	0.38	0.25	0.15
							10^8 cyc	0.73	1.58	0.61	1.56	1.27	1.51	0.96	1.41	2.23	1.41
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bnd	10.023	11.240	-4.042	0.19	10^3 cyc	1.1	0.38	0.58	0.29	0.32	0.38	0.63	0.42	0.27	0.16
							10^8 cyc	0.68	1.48	0.58	1.46	1.19	1.42	0.9	1.33	2.1	1.32
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.55	0.19	0.29	0.15	0.16	0.19	0.32	0.21	0.14	0.08
							10^8 cyc	0.93	2.01	0.78	1.98	1.61	1.93	1.22	1.8	2.84	1.79

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #41	#42	#43	#44	#45	#46	#47	#48	#49	#50
#1	SSC:1(all steels)	Baseplate	13.825	15.550	-5.729	0.75	10^3 cyc	0.47	1.33	1.15	1.15	0.38	0.48	0.34	1.02	0.83	0.34
							10^8 cyc	0.73	0.26	0.23	0.23	0.56	0.93	0.48	0.24	0.16	0.29
#2	SSC:1M	Baseplate Mild Steel	21.679	25.360	-12.229	0.71	10^3 cyc	1.42	4.01	3.49	3.49	1.16	1.46	1.01	3.08	2.52	1.04
							10^8 cyc	0.76	0.27	0.24	0.24	0.58	0.97	0.5	0.25	0.17	0.3
#3	SSC:1H	Baseplate HSLA Steel	27.389	32.040	-15.449	0.91	10^3 cyc	1.39	3.91	3.4	3.4	1.13	1.42	0.99	3	2.45	1.02
							10^8 cyc	0.61	0.21	0.19	0.19	0.47	0.78	0.4	0.2	0.13	0.24
#4	SSC:1Q	Baseplate Q & T Steel	13.345	14.910	-5.199	0.88	10^3 cyc	0.36	1.02	0.89	0.89	0.29	0.37	0.26	0.78	0.64	0.27
							10^8 cyc	0.69	0.24	0.22	0.22	0.53	0.88	0.45	0.23	0.15	0.27
#5	SSC:1(F)	Baseplate Flame Cut	12.334	13.780	-4.805	0.60	10^3 cyc	0.39	1.11	0.97	0.97	0.32	0.4	0.28	0.85	0.7	0.29
							10^8 cyc	0.91	0.31	0.29	0.29	0.69	1.15	0.59	0.3	0.2	0.36
#6	SSC:2	Rolled I-Beam Bending	13.999	15.820	-6.048	0.64	10^3 cyc	0.56	1.59	1.38	1.38	0.46	0.58	0.4	1.22	1	0.41
							10^8 cyc	0.79	0.28	0.25	0.25	0.61	1.01	0.52	0.26	0.17	0.31
#7	SSC:3	Longitudinal Seam	13.010	14.800	-5.946	0.63	10^3 cyc	0.77	2.16	1.88	1.88	0.62	0.79	0.55	1.66	1.35	0.56
							10^8 cyc	1.11	0.39	0.35	0.35	0.85	1.41	0.72	0.37	0.24	0.44
#8	SSC:3(G)	Ground Long. Seam	13.602	15.520	-6.370	0.74	10^3 cyc	0.82	2.31	2.01	2.01	0.66	0.84	0.58	1.77	1.45	0.6
							10^8 cyc	1.04	0.36	0.33	0.33	0.8	1.32	0.68	0.35	0.23	0.41
#9	SSC:4	Long. Fillet Weld Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	0.76	2.14	1.86	1.86	0.62	0.78	0.54	1.64	1.34	0.56
							10^8 cyc	1.21	0.42	0.38	0.38	0.93	1.54	0.79	0.4	0.26	0.48
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	8.663	9.650	-3.278	0.48	10^3 cyc	0.58	1.63	1.42	1.42	0.47	0.59	0.41	1.25	1.02	0.42
							10^8 cyc	4.06	1.41	1.28	1.28	3.11	5.16	2.65	1.35	0.88	1.61
#11	SSC:6	Dbl I-Bm Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	0.76	2.14	1.86	1.86	0.62	0.78	0.54	1.64	1.34	0.56
							10^8 cyc	1.21	0.42	0.38	0.38	0.93	1.54	0.79	0.4	0.26	0.48
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	10.095	11.230	-3.771	0.53	10^3 cyc	0.42	1.19	1.04	1.04	0.34	0.43	0.3	0.91	0.75	0.31
							10^8 cyc	1.87	0.65	0.59	0.59	1.43	2.37	1.22	0.62	0.41	0.74
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	10.204	11.460	-4.172	0.51	10^3 cyc	0.62	1.75	1.52	1.52	0.5	0.64	0.44	1.34	1.1	0.45
							10^8 cyc	2.05	0.71	0.65	0.65	1.57	2.6	1.34	0.68	0.45	0.81
#14	SSC:8	Bolted Double Lap	14.469	16.440	-6.549	0.81	10^3 cyc	0.68	1.91	1.66	1.66	0.55	0.69	0.48	1.47	1.2	0.5
							10^8 cyc	0.82	0.29	0.26	0.26	0.63	1.04	0.54	0.27	0.18	0.32
#15	SSC:9	Riveted Single Lap	16.687	19.590	-9.643	0.90	10^3 cyc	1.67	4.7	4.09	4.09	1.35	1.71	1.19	3.61	2.95	1.22
							10^8 cyc	1.15	0.4	0.36	0.36	0.88	1.46	0.75	0.38	0.25	0.45
#16	SSC:10M	Butt Weld Axial:Mild Steel	14.345	16.630	-7.589	0.88	10^3 cyc	1.28	3.62	3.15	3.15	1.04	1.32	0.91	2.78	2.27	0.94
							10^8 cyc	1.22	0.43	0.39	0.39	0.94	1.55	0.8	0.41	0.27	0.48
#17	SSC:10H	Butt Weld Axial:HSLA Steel	22.068	25.920	-12.795	0.96	10^3 cyc	1.58	4.45	3.87	3.87	1.28	1.62	1.12	3.42	2.79	1.16
							10^8 cyc	0.81	0.28	0.26	0.26	0.62	1.03	0.53	0.27	0.18	0.32
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	12.108	13.650	-5.124	0.76	10^3 cyc	0.59	1.66	1.44	1.44	0.48	0.6	0.42	1.27	1.04	0.43
							10^8 cyc	1.16	0.4	0.37	0.37	0.89	1.48	0.76	0.39	0.25	0.46
#19	SSC:10(G)	Butt Weld Axial:Ground	14.784	16.930	-7.130	0.94	10^3 cyc	0.87	2.46	2.14	2.14	0.71	0.9	0.62	1.89	1.55	0.64
							10^8 cyc	0.92	0.32	0.29	0.29	0.7	1.17	0.6	0.31	0.2	0.36
#20	SSC:10A	Butt Weld Bndg	12.494	14.140	-5.468	0.79	10^3 cyc	0.66	1.86	1.62	1.62	0.54	0.68	0.47	1.43	1.17	0.48
							10^8 cyc	1.13	0.39	0.36	0.36	0.87	1.44	0.74	0.38	0.25	0.45
#21	SSC:11	I-Bm Butt Weld Bndg	12.035	13.770	-5.765	0.68	10^3 cyc	0.99	2.79	2.43	2.43	0.8	1.02	0.71	2.15	1.75	0.73
							10^8 cyc	1.53	0.53	0.48	0.48	1.17	1.94	1	0.51	0.33	0.6
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	10.366	11.690	-4.398	0.43	10^3 cyc	0.71	2	1.74	1.74	0.58	0.73	0.51	1.54	1.26	0.52
							10^8 cyc	2.04	0.71	0.64	0.64	1.56	2.59	1.33	0.68	0.44	0.81
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	12.415	14.120	-5.663	0.60	10^3 cyc	0.79	2.23	1.94	1.94	0.64	0.81	0.56	1.71	1.4	0.58
							10^8 cyc	1.26	0.44	0.4	0.4	0.97	1.6	0.82	0.42	0.27	0.5
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	10.847	12.120	-4.229	0.45	10^3 cyc	0.46	1.31	1.14	1.14	0.38	0.48	0.33	1	0.82	0.34
							10^8 cyc	1.47	0.51	0.47	0.47	1.13	1.87	0.96	0.49	0.32	0.58
#25	SSC:14	Disc. Cruciform Axial	14.721	16.960	-7.439	0.91	10^3 cyc	1.06	2.99	2.6	2.6	0.86	1.09	0.75	2.29	1.87	0.78
							10^8 cyc	1.04	0.36	0.33	0.33	0.8	1.32	0.68	0.35	0.23	0.41
#26	SSC:15	Loaded Edge Attachment Plate	9.566	10.830	-4.200	0.43	10^3 cyc	0.91	2.56	2.22	2.22	0.74	0.93	0.65	1.96	1.6	0.66
							10^8 cyc	2.94	1.02	0.93	0.93	2.25	3.73	1.92	0.98	0.64	1.16
#27	SSC:16	Partial Pen. Butt Weld	10.626	12.020	-4.631	0.58	10^3 cyc	0.77	2.17	1.89	1.89	0.63	0.79	0.55	1.67	1.36	0.56
							10^8 cyc	1.94	0.67	0.61	0.61	1.48	2.46	1.26	0.64	0.42	0.76
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	13.455	15.550	-6.960	0.95	10^3 cyc	1.23	3.46	3.01	3.01	1	1.26	0.87	2.65	2.17	0.9
							10^8 cyc	1.34	0.47	0.42	0.42	1.03	1.7	0.87	0.45	0.29	0.53
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	9.265	10.390	-3.736	0.34	10^3 cyc	0.67	1.9	1.65	1.65	0.55	0.69	0.48	1.46	1.19	0.49
							10^8 cyc	3.08	1.07	0.97	0.97	2.35	3.9	2	1.02	0.67	1.22
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	1.59	4.49	3.9	3.9	1.29	1.63	1.13	3.45	2.82	1.17
							10^8 cyc	1.46	0.51	0.46	0.46	1.12	1.86	0.95	0.49	0.32	0.58
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	9.097	10.140	-3.465	0.39	10^3 cyc	0.55	1.54	1.34	1.34	0.44	0.56	0.39	1.18	0.97	0.4
							10^8 cyc	3.17	1.1	1	1	2.43	4.02	2.07	1.05	0.69	1.25
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	1.59	4.49	3.9	3.9	1.29	1.63	1.13	3.45	2.82	1.17
							10^8 cyc	1.46	0.51	0.46	0.46	1.12	1.86	0.95	0.49	0.32	0.58
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	9.048	10.260	-4.027	0.65	10^3 cyc	1.03	2.91	2.53	2.53	0.84	1.06	0.73	2.23	1.82	0.76
							10^8 cyc	3.76	1.31	1.19	1.19	2.88	4.78	2.45	1.25	0.82	1.49
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	15.241	18.020	-9.233	0.75	10^3 cyc	2.03	5.74	4.99	4.99	1.65	2.09	1.45	4.41	3.6	1.49
							10^8 cyc	1.48	0.51	0.47	0.47	1.13	1.88	0.97	0.49	0.32	0.59
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	12.941	15.190	-7.472	0.93	10^3 cyc	1.87	5.26	4.57	4.57	1.52	1.91	1.33	4.04	3.3	1.37
							10^8 cyc	1.82	0.63	0.58	0.58	1.39	2.31	1.19	0.61	0.4	0.72

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #41	#42	#43	#44	#45	#46	#47	#48	#49	#50
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	13.566	15.830	-7.520	0.93	10^3 cyc	1.57	4.44	3.86	3.86	1.28	1.62	1.12	3.41	2.78	1.15
							10^8 cyc	1.52	0.53	0.48	0.48	1.17	1.93	0.99	0.51	0.33	0.6
#37	SSC:20	Plate Penetration: Axial	10.180	11.570	-4.619	0.66	10^3 cyc	0.95	2.68	2.33	2.33	0.77	0.98	0.68	2.06	1.68	0.7
							10^8 cyc	2.41	0.84	0.76	0.76	1.84	3.06	1.57	0.8	0.52	0.95
#38	SSC:20(S)	Plate Penetration: Shear	12.695	14.730	-6.759	0.93	10^3 cyc	1.42	4	3.48	3.48	1.15	1.46	1.01	3.07	2.51	1.04
							10^8 cyc	1.63	0.57	0.52	0.52	1.25	2.07	1.06	0.54	0.35	0.64
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	22.432	26.720	-14.245	0.62	10^3 cyc	2.2	6.21	5.39	5.39	1.79	2.26	1.57	4.77	3.89	1.61
							10^8 cyc	1.03	0.36	0.33	0.33	0.79	1.31	0.67	0.34	0.22	0.41
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	20.826	25.490	-15.494	0.62	10^3 cyc	3.72	10.5	9.13	9.13	3.02	3.82	2.65	8.06	6.58	2.73
							10^8 cyc	1.64	0.57	0.52	0.52	1.25	2.08	1.07	0.54	0.36	0.65
#41	SSC:21(S)	Plate Penetration: Shear	14.765	16.980	-7.358	0.83	10^3 cyc	1	2.82	2.45	2.45	0.81	1.03	0.71	2.17	1.77	0.73
							10^8 cyc	1	0.35	0.32	0.32	0.77	1.27	0.65	0.33	0.22	0.4
#42	SSC:22	Tee with Stud Attachment: Bndg	9.093	10.040	-3.147	0.32	10^3 cyc	0.35	1	0.87	0.87	0.29	0.36	0.25	0.77	0.63	0.26
							10^8 cyc	2.88	1	0.91	0.91	2.2	3.65	1.88	0.96	0.63	1.14
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.41	1.15	1	1	0.33	0.42	0.29	0.88	0.72	0.3
							10^8 cyc	3.16	1.1	1	1	2.42	4.01	2.06	1.05	0.69	1.25
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.41	1.15	1	1	0.33	0.42	0.29	0.88	0.72	0.3
							10^8 cyc	3.16	1.1	1	1	2.42	4.01	2.06	1.05	0.69	1.25
#45	SSC:25	Continuous Cruciform	13.656	15.790	-7.090	0.78	10^3 cyc	1.23	3.47	3.02	3.02	1	1.26	0.88	2.67	2.18	0.9
							10^8 cyc	1.31	0.45	0.41	0.41	1	1.66	0.85	0.43	0.28	0.52
#46	SSC:25A	Plate with Transv. Side Attachment	16.906	19.470	-8.518	0.91	10^3 cyc	0.97	2.75	2.39	2.39	0.79	1	0.69	2.11	1.72	0.71
							10^8 cyc	0.79	0.27	0.25	0.25	0.6	1	0.51	0.26	0.17	0.31
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	13.053	15.150	-6.966	0.63	10^3 cyc	1.4	3.96	3.44	3.44	1.14	1.44	1	3.04	2.48	1.03
							10^8 cyc	1.53	0.53	0.49	0.49	1.17	1.95	1	0.51	0.33	0.61
#48	SSC:26	Welded Cover Plate	9.122	10.130	-3.348	0.61	10^3 cyc	0.46	1.3	1.13	1.13	0.37	0.47	0.33	1	0.82	0.34
							10^8 cyc	3.01	1.05	0.95	0.95	2.3	3.82	1.96	1	0.65	1.19
#49	SSC:27	Double Lapped Plate with Plug Welds	8.453	9.400	-3.146	0.58	10^3 cyc	0.57	1.6	1.39	1.39	0.46	0.58	0.4	1.22	1	0.41
							10^8 cyc	4.59	1.6	1.45	1.45	3.52	5.83	3	1.53	1	1.82
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	10.471	12.060	-5.277	0.54	10^3 cyc	1.36	3.85	3.35	3.35	1.11	1.4	0.97	2.96	2.41	1
							10^8 cyc	2.53	0.88	0.8	0.8	1.94	3.21	1.65	0.84	0.55	1
#51	SSC:28	Baseplate with Circular Hole	15.078	17.410	-7.746	0.81	10^3 cyc	1.12	3.15	2.73	2.73	0.91	1.14	0.79	2.42	1.97	0.82
							10^8 cyc	1.03	0.36	0.33	0.33	0.79	1.31	0.67	0.34	0.22	0.41
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.919	9.870	-3.159	0.31	10^3 cyc	0.41	1.16	1	1	0.33	0.42	0.29	0.89	0.72	0.3
							10^8 cyc	3.28	1.14	1.04	1.04	2.51	4.16	2.14	1.09	0.71	1.3
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.566	10.580	-3.368	0.10	10^3 cyc	0.35	0.99	0.86	0.86	0.28	0.36	0.25	0.76	0.62	0.26
							10^8 cyc	2.23	0.78	0.71	0.71	1.71	2.84	1.46	0.74	0.49	0.88
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	9.381	10.670	-4.348	0.62	10^3 cyc	1.15	3.25	2.83	2.83	0.94	1.18	0.82	2.5	2.04	0.85
							10^8 cyc	3.41	1.18	1.08	1.08	2.61	4.33	2.22	1.13	0.74	1.35
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg *	9.091	10.130	-3.453	0.44	10^3 cyc	0.54	1.52	1.32	1.32	0.44	0.55	0.38	1.17	0.96	0.4
							10^8 cyc	3.17	1.1	1	1	2.43	4.02	2.07	1.05	0.69	1.25
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	9.566	10.830	-4.200	0.43	10^3 cyc	0.91	2.56	2.22	2.22	0.74	0.93	0.65	1.96	1.6	0.66
							10^8 cyc	2.94	1.02	0.93	0.93	2.25	3.73	1.92	0.98	0.64	1.16
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	8.646	9.710	-3.533	0.62	10^3 cyc	0.8	2.25	1.95	1.95	0.65	0.82	0.57	1.73	1.41	0.58
							10^8 cyc	4.33	1.51	1.37	1.37	3.32	5.5	2.83	1.44	0.94	1.71
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	8.758	9.860	-3.660	0.50	10^3 cyc	0.85	2.4	2.09	2.09	0.69	0.87	0.61	1.84	1.51	0.62
							10^8 cyc	4.14	1.44	1.31	1.31	3.17	5.25	2.7	1.38	0.9	1.64
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	16.469	19.590	-10.368	0.81	10^3 cyc	2.26	6.37	5.54	5.54	1.83	2.32	1.61	4.89	3.99	1.66
							10^8 cyc	1.43	0.5	0.45	0.45	1.1	1.82	0.94	0.48	0.31	0.57
#60	SSC:35	Butt Weld with Backing Bar	9.604	10.750	-3.808	0.28	10^3 cyc	0.59	1.68	1.46	1.46	0.48	0.61	0.42	1.29	1.05	0.44
							10^8 cyc	2.56	0.89	0.81	0.81	1.96	3.24	1.67	0.85	0.56	1.01
#61	SSC:36	Skip Welded Plates with Rathole	13.053	15.150	-6.966	0.63	10^3 cyc	1.4	3.96	3.44	3.44	1.14	1.44	1	3.04	2.48	1.03
							10^8 cyc	1.53	0.53	0.49	0.49	1.17	1.95	1	0.51	0.33	0.61
#62	SSC:36A	Skip Welded Plates	11.326	12.880	-5.163	0.46	10^3 cyc	0.86	2.43	2.11	2.11	0.7	0.88	0.61	1.87	1.52	0.63
							10^8 cyc	1.68	0.58	0.53	0.53	1.28	2.13	1.09	0.56	0.36	0.66
#63	SSC:38	Stiffener Plate Penetration: Bndg	9.128	10.170	-3.462	0.36	10^3 cyc	0.53	1.5	1.31	1.31	0.43	0.55	0.38	1.15	0.94	0.39
							10^8 cyc	3.1	1.08	0.98	0.98	2.37	3.94	2.02	1.03	0.67	1.23
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	14.312	17.390	-10.225	0.88	10^3 cyc	3.5	9.88	8.59	8.59	2.84	3.59	2.49	7.59	6.19	2.57
							10^8 cyc	2.26	0.79	0.71	0.71	1.73	2.87	1.47	0.75	0.49	0.89
#65	SSC:40	Stiffener Intersection: Bending	8.646	9.710	-3.533	0.62	10^3 cyc	0.8	2.25	1.95	1.95	0.65	0.82	0.57	1.73	1.41	0.58
							10^8 cyc	4.33	1.51	1.37	1.37	3.32	5.5	2.83	1.44	0.94	1.71
#66	SSC:42	Bending of Long Attachment	14.765	16.980	-7.358	0.83	10^3 cyc	1	2.82	2.45	2.45	0.81	1.03	0.71	2.17	1.77	0.73
							10^8 cyc	1	0.35	0.32	0.32	0.77	1.27	0.65	0.33	0.22	0.4
#67	SSC:46	Long. Welds on Support Gussets: Axial	9.381	10.670	-4.348	0.62	10^3 cyc	1.15	3.25	2.83	2.83	0.94	1.18	0.82	2.5	2.04	0.85
							10^8 cyc	3.41	1.18	1.08	1.08	2.61	4.33	2.22	1.13	0.74	1.35
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.781	10.930	-3.818	0.07	10^3 cyc	0.54	1.52	1.32	1.32	0.44	0.55	0.38	1.17	0.96	0.4
							10^8 cyc	2.31	0.8	0.73	0.73	1.76	2.93	1.5	0.77	0.5	0.91
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bnd	10.023	11.240	-4.042	0.19	10^3 cyc	0.6	1.69	1.47	1.47	0.49	0.62	0.43	1.3	1.06	0.44
							10^8 cyc	2.17	0.75	0.69	0.69	1.66	2.75	1.41	0.72	0.47	0.86
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.3	0.85	0.74	0.74	0.25	0.31	0.22	0.65	0.53	0.22
							10^8 cyc	2.93	1.02	0.93	0.93	2.25	3.73	1.91	0.98	0.64	1.16

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #51	#52	#53	#54	#55	#56	#57	#58	#59	#60
#1	SSC:1(all steels)	Baseplate	13.825	15.550	-5.729	0.75	10^3 cyc	0.42	1.15	1.34	0.41	0.87	0.52	0.59	0.55	0.21	0.79
							10^8 cyc	0.71	0.22	0.33	0.22	0.23	0.25	0.17	0.18	0.51	0.29
#2	SSC:1M	Baseplate Mild Steel	21.679	25.360	-12.229	0.71	10^3 cyc	1.28	3.47	4.06	1.23	2.63	1.57	1.79	1.67	0.63	2.39
							10^8 cyc	0.74	0.23	0.34	0.22	0.24	0.26	0.18	0.18	0.53	0.3
#3	SSC:1H	Baseplate HSLA Steel	27.389	32.040	-15.449	0.91	10^3 cyc	1.24	3.39	3.96	1.2	2.57	1.53	1.74	1.63	0.61	2.33
							10^8 cyc	0.59	0.19	0.27	0.18	0.19	0.21	0.14	0.15	0.43	0.24
#4	SSC:1Q	Baseplate Q & T Steel	13.345	14.910	-5.199	0.68	10^3 cyc	0.32	0.88	1.03	0.31	0.67	0.4	0.45	0.43	0.16	0.61
							10^8 cyc	0.67	0.21	0.31	0.2	0.22	0.24	0.16	0.17	0.48	0.27
#5	SSC:1(F)	Baseplate Flame Cut	12.334	13.780	-4.805	0.60	10^3 cyc	0.35	0.96	1.13	0.34	0.73	0.43	0.49	0.46	0.17	0.66
							10^8 cyc	0.88	0.28	0.41	0.27	0.29	0.31	0.21	0.22	0.63	0.35
#6	SSC:2	Rolled I-Beam Bending	13.999	15.820	-6.048	0.64	10^3 cyc	0.51	1.38	1.61	0.49	1.04	0.62	0.71	0.66	0.25	0.95
							10^8 cyc	0.77	0.24	0.35	0.23	0.25	0.27	0.18	0.19	0.55	0.31
#7	SSC:3	Longitudinal Seam	13.010	14.800	-5.946	0.63	10^3 cyc	0.69	1.87	2.19	0.66	1.42	0.84	0.96	0.9	0.34	1.29
							10^8 cyc	1.08	0.34	0.5	0.33	0.35	0.38	0.26	0.27	0.77	0.43
#8	SSC:3(G)	Ground Long. Seam	13.602	15.520	-6.370	0.74	10^3 cyc	0.73	2	2.34	0.71	1.52	0.9	1.03	0.96	0.36	1.38
							10^8 cyc	1.01	0.32	0.47	0.31	0.33	0.36	0.24	0.25	0.73	0.41
#9	SSC:4	Long. Fillet Weld Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	0.68	1.85	2.17	0.66	1.41	0.84	0.95	0.89	0.34	1.28
							10^8 cyc	1.18	0.37	0.54	0.36	0.38	0.41	0.28	0.29	0.85	0.47
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	8.663	9.650	-3.278	0.48	10^3 cyc	0.52	1.41	1.65	0.5	1.07	0.64	0.73	0.68	0.26	0.97
							10^8 cyc	3.94	1.24	1.82	1.19	1.28	1.38	0.94	0.98	2.83	1.59
#11	SSC:6	Dbl I-Bm Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	0.68	1.85	2.17	0.66	1.41	0.84	0.95	0.89	0.34	1.28
							10^8 cyc	1.18	0.37	0.54	0.36	0.38	0.41	0.28	0.29	0.85	0.47
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	10.095	11.230	-3.771	0.53	10^3 cyc	0.38	1.03	1.21	0.37	0.78	0.47	0.53	0.5	0.19	0.71
							10^8 cyc	1.81	0.57	0.84	0.55	0.59	0.64	0.43	0.45	1.3	0.73
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	10.204	11.460	-4.172	0.51	10^3 cyc	0.56	1.52	1.77	0.54	1.15	0.69	0.78	0.73	0.27	1.04
							10^8 cyc	1.99	0.63	0.92	0.6	0.65	0.7	0.47	0.5	1.43	0.8
#14	SSC:8	Bolted Double Lap	14.469	16.440	-6.549	0.81	10^3 cyc	0.61	1.65	1.93	0.59	1.25	0.75	0.85	0.79	0.3	1.14
							10^8 cyc	0.8	0.25	0.37	0.24	0.26	0.28	0.19	0.2	0.57	0.32
#15	SSC:9	Riveted Single Lap	16.687	19.590	-9.643	0.90	10^3 cyc	1.49	4.07	4.76	1.44	3.09	1.84	2.09	1.96	0.74	2.8
							10^8 cyc	1.12	0.35	0.51	0.34	0.36	0.39	0.27	0.28	0.8	0.45
#16	SSC:10M	Butt Weld Axial:Mild Steel	14.345	16.630	-7.589	0.88	10^3 cyc	1.15	3.13	3.67	1.11	2.38	1.42	1.61	1.51	0.57	2.16
							10^8 cyc	1.19	0.37	0.55	0.36	0.39	0.42	0.28	0.3	0.85	0.48
#17	SSC:10H	Butt Weld Axial:HSLA Steel	22.068	25.920	-12.795	0.96	10^3 cyc	1.41	3.85	4.51	1.37	2.92	1.74	1.98	1.85	0.7	2.65
							10^8 cyc	0.79	0.25	0.36	0.24	0.26	0.28	0.19	0.2	0.57	0.32
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	12.108	13.650	-5.124	0.76	10^3 cyc	0.53	1.43	1.68	0.51	1.09	0.65	0.74	0.69	0.26	0.99
							10^8 cyc	1.13	0.35	0.52	0.34	0.37	0.4	0.27	0.28	0.81	0.45
#19	SSC:10(G)	Butt Weld Axial:Ground	14.784	16.930	-7.130	0.94	10^3 cyc	0.78	2.13	2.5	0.76	1.62	0.96	1.1	1.03	0.39	1.47
							10^8 cyc	0.89	0.28	0.41	0.27	0.29	0.31	0.21	0.22	0.64	0.36
#20	SSC:10A	Butt Weld Bndg	12.494	14.140	-5.468	0.79	10^3 cyc	0.59	1.61	1.89	0.57	1.22	0.73	0.83	0.77	0.29	1.11
							10^8 cyc	1.1	0.35	0.51	0.33	0.36	0.39	0.26	0.27	0.79	0.44
#21	SSC:11	I-Bm Butt Weld Bndg	12.035	13.770	-5.765	0.68	10^3 cyc	0.89	2.42	2.83	0.86	1.83	1.09	1.24	1.16	0.44	1.67
							10^8 cyc	1.48	0.47	0.68	0.45	0.48	0.52	0.35	0.37	1.06	0.6
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	10.366	11.690	-4.398	0.43	10^3 cyc	0.64	1.73	2.03	0.62	1.32	0.78	0.89	0.83	0.31	1.2
							10^8 cyc	1.97	0.62	0.91	0.6	0.64	0.69	0.47	0.49	1.42	0.8
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	12.415	14.120	-5.663	0.60	10^3 cyc	0.71	1.93	2.26	0.69	1.46	0.87	0.99	0.93	0.35	1.33
							10^8 cyc	1.22	0.39	0.57	0.37	0.4	0.43	0.29	0.31	0.88	0.49
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	10.847	12.120	-4.229	0.45	10^3 cyc	0.42	1.13	1.32	0.4	0.86	0.51	0.58	0.54	0.21	0.78
							10^8 cyc	1.43	0.45	0.66	0.43	0.47	0.5	0.34	0.36	1.03	0.58
#25	SSC:14	Disc. Cruciform Axial	14.721	16.960	-7.439	0.91	10^3 cyc	0.95	2.58	3.03	0.92	1.96	1.17	1.33	1.24	0.47	1.78
							10^8 cyc	1.01	0.32	0.47	0.31	0.33	0.35	0.24	0.25	0.73	0.41
#26	SSC:15	Loaded Edge Attachment Plate	9.566	10.830	-4.200	0.43	10^3 cyc	0.81	2.21	2.59	0.79	1.68	1	1.14	1.06	0.4	1.52
							10^8 cyc	2.85	0.9	1.32	0.86	0.93	1	0.68	0.71	2.05	1.15
#27	SSC:16	Partial Pen. Butt Weld	10.626	12.020	-4.631	0.58	10^3 cyc	0.69	1.88	2.2	0.67	1.43	0.85	0.97	0.9	0.34	1.3
							10^8 cyc	1.88	0.59	0.87	0.57	0.61	0.66	0.45	0.47	1.35	0.76
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	13.455	15.550	-6.960	0.95	10^3 cyc	1.1	2.99	3.5	1.06	2.27	1.35	1.54	1.44	0.54	2.06
							10^8 cyc	1.3	0.41	0.6	0.39	0.42	0.46	0.31	0.32	0.93	0.52
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	9.265	10.390	-3.736	0.34	10^3 cyc	0.6	1.65	1.93	0.58	1.25	0.74	0.85	0.79	0.3	1.13
							10^8 cyc	2.98	0.94	1.38	0.9	0.97	1.05	0.71	0.74	2.14	1.2
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	1.43	3.89	4.55	1.38	2.95	1.76	2	1.87	0.7	2.68
							10^8 cyc	1.42	0.45	0.65	0.43	0.46	0.5	0.34	0.35	1.02	0.57
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	9.097	10.140	-3.465	0.39	10^3 cyc	0.49	1.33	1.56	0.47	1.01	0.6	0.69	0.64	0.24	0.92
							10^8 cyc	3.07	0.97	1.42	0.93	1	1.08	0.73	0.77	2.21	1.24
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	1.43	3.89	4.55	1.38	2.95	1.76	2	1.87	0.7	2.68
							10^8 cyc	1.42	0.45	0.65	0.43	0.46	0.5	0.34	0.35	1.02	0.57
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	9.048	10.260	-4.027	0.65	10^3 cyc	0.92	2.52	2.95	0.89	1.91	1.14	1.29	1.21	0.46	1.74
							10^8 cyc	3.65	1.15	1.68	1.1	1.19	1.28	0.87	0.91	2.62	1.47
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	15.241	18.020	-9.233	0.75	10^3 cyc	1.82	4.97	5.81	1.76	3.77	2.24	2.55	2.39	0.9	3.42
							10^8 cyc	1.44	0.45	0.66	0.43	0.47	0.5	0.34	0.36	1.03	0.58
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	12.941	15.190	-7.472	0.93	10^3 cyc	1.67	4.55	5.33	1.62	3.45	2.06	2.34	2.19	0.83	3.14
							10^8 cyc	1.77	0.56	0.82	0.53	0.57	0.62	0.42	0.44	1.27	0.71

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #51	#52	#53	#54	#55	#56	#57	#58	#59	#60
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	13.566	15.830	-7.520	0.93	10^3 cyc	1.41	3.84	4.5	1.36	2.91	1.74	1.98	1.85	0.7	2.65
							10^8 cyc	1.48	0.46	0.68	0.45	0.48	0.52	0.35	0.37	1.06	0.6
#37	SSC:20	Plate Penetration: Axial	10.180	11.570	-4.619	0.66	10^3 cyc	0.85	2.32	2.72	0.82	1.76	1.05	1.19	1.12	0.42	1.6
							10^8 cyc	2.33	0.73	1.08	0.71	0.76	0.82	0.56	0.58	1.68	0.94
#38	SSC:20(S)	Plate Penetration: Shear	12.895	14.730	-6.759	0.93	10^3 cyc	1.27	3.46	4.05	1.23	2.63	1.57	1.78	1.67	0.63	2.39
							10^8 cyc	1.58	0.5	0.73	0.48	0.51	0.55	0.38	0.39	1.14	0.64
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	22.432	26.720	-14.245	0.62	10^3 cyc	1.97	5.37	6.29	1.91	4.07	2.43	2.76	2.58	0.97	3.7
							10^8 cyc	1	0.31	0.46	0.3	0.33	0.35	0.24	0.25	0.72	0.4
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	20.826	25.490	-15.494	0.62	10^3 cyc	3.34	9.08	10.64	3.23	6.89	4.11	4.67	4.37	1.65	6.26
							10^8 cyc	1.59	0.5	0.73	0.48	0.52	0.56	0.38	0.4	1.14	0.64
#41	SSC:21(S)	Plate Penetration: Shear	14.765	16.980	-7.358	0.83	10^3 cyc	0.9	2.44	2.86	0.87	1.85	1.1	1.26	1.17	0.44	1.68
							10^8 cyc	0.97	0.3	0.45	0.29	0.32	0.34	0.23	0.24	0.7	0.39
#42	SSC:22	Tee with Stud Attachment: Bndg	9.093	10.040	-3.147	0.32	10^3 cyc	0.32	0.87	1.01	0.31	0.66	0.39	0.45	0.42	0.16	0.6
							10^8 cyc	2.79	0.88	1.29	0.84	0.91	0.98	0.66	0.7	2.01	1.13
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.37	1	1.17	0.35	0.76	0.45	0.51	0.48	0.18	0.69
							10^8 cyc	3.06	0.96	1.42	0.93	1	1.08	0.73	0.76	2.2	1.24
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.37	1	1.17	0.35	0.76	0.45	0.51	0.48	0.18	0.69
							10^8 cyc	3.06	0.96	1.42	0.93	1	1.08	0.73	0.76	2.2	1.24
#45	SSC:25	Continuous Cruciform	13.656	15.790	-7.090	0.78	10^3 cyc	1.1	3.01	3.52	1.07	2.28	1.36	1.55	1.45	0.55	2.07
							10^8 cyc	1.27	0.4	0.58	0.38	0.41	0.44	0.3	0.32	0.91	0.51
#46	SSC:25A	Plate with Transv. Side Attachment	16.906	19.470	-8.518	0.91	10^3 cyc	0.87	2.38	2.79	0.85	1.8	1.08	1.22	1.14	0.43	1.64
							10^8 cyc	0.76	0.24	0.35	0.23	0.25	0.27	0.18	0.19	0.55	0.31
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	13.053	15.150	-6.966	0.63	10^3 cyc	1.26	3.43	4.01	1.22	2.6	1.55	1.76	1.65	0.62	2.36
							10^8 cyc	1.49	0.47	0.69	0.45	0.48	0.52	0.35	0.37	1.07	0.6
#48	SSC:26	Welded Cover Plate	9.122	10.130	-3.348	0.61	10^3 cyc	0.41	1.13	1.32	0.4	0.85	0.51	0.58	0.54	0.2	0.78
							10^8 cyc	2.92	0.92	1.35	0.88	0.95	1.02	0.69	0.73	2.1	1.18
#49	SSC:27	Double Lapped Plate with Plug Welds	8.453	9.400	-3.146	0.58	10^3 cyc	0.51	1.38	1.62	0.49	1.05	0.62	0.71	0.66	0.25	0.95
							10^8 cyc	4.45	1.4	2.06	1.35	1.45	1.56	1.06	1.11	3.2	1.8
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	10.471	12.060	-5.277	0.54	10^3 cyc	1.22	3.33	3.9	1.18	2.53	1.51	1.71	1.6	0.6	2.3
							10^8 cyc	2.45	0.77	1.13	0.74	0.8	0.86	0.58	0.61	1.76	0.99
#51	SSC:28	Baseplate with Circular Hole	15.078	17.410	-7.746	0.81	10^3 cyc	1	2.72	3.19	0.97	2.06	1.23	1.4	1.31	0.49	1.88
							10^8 cyc	1	0.31	0.46	0.3	0.33	0.35	0.24	0.25	0.72	0.4
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.919	9.870	-3.159	0.31	10^3 cyc	0.37	1	1.17	0.36	0.76	0.45	0.51	0.48	0.18	0.69
							10^8 cyc	3.18	1	1.47	0.96	1.03	1.12	0.76	0.79	2.29	1.28
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.566	10.580	-3.388	0.10	10^3 cyc	0.31	0.85	1	0.3	0.65	0.39	0.44	0.41	0.15	0.59
							10^8 cyc	2.17	0.68	1	0.66	0.7	0.76	0.52	0.54	1.56	0.87
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	9.381	10.670	-4.348	0.62	10^3 cyc	1.03	2.82	3.3	1	2.14	1.27	1.45	1.35	0.51	1.94
							10^8 cyc	3.3	1.04	1.53	1	1.08	1.16	0.79	0.82	2.38	1.33
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	9.091	10.130	-3.453	0.44	10^3 cyc	0.48	1.32	1.54	0.47	1	0.6	0.68	0.63	0.24	0.91
							10^8 cyc	3.07	0.97	1.42	0.93	1	1.08	0.73	0.77	2.21	1.24
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	9.566	10.830	-4.200	0.43	10^3 cyc	0.81	2.21	2.59	0.79	1.68	1	1.14	1.06	0.4	1.52
							10^8 cyc	2.85	0.9	1.32	0.86	0.93	1	0.68	0.71	2.05	1.15
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	8.646	9.710	-3.533	0.62	10^3 cyc	0.71	1.94	2.28	0.69	1.47	0.88	1	0.94	0.35	1.34
							10^8 cyc	4.2	1.32	1.94	1.27	1.37	1.47	1	1.05	3.02	1.7
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	8.758	9.860	-3.660	0.50	10^3 cyc	0.76	2.08	2.43	0.74	1.58	0.94	1.07	1	0.38	1.43
							10^8 cyc	4.01	1.26	1.85	1.21	1.31	1.41	0.95	1	2.89	1.62
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	16.469	19.590	-10.368	0.81	10^3 cyc	2.02	5.51	6.45	1.96	4.18	2.49	2.84	2.65	1	3.8
							10^8 cyc	1.39	0.44	0.64	0.42	0.45	0.49	0.33	0.35	1	0.56
#60	SSC:35	Butt Weld with Backing Bar	9.804	10.750	-3.808	0.28	10^3 cyc	0.53	1.45	1.7	0.52	1.1	0.66	0.75	0.7	0.26	1
							10^8 cyc	2.48	0.78	1.14	0.75	0.81	0.87	0.59	0.62	1.78	1
#61	SSC:36	Skip Welded Plates with Rathole	13.053	15.150	-6.966	0.63	10^3 cyc	1.26	3.43	4.01	1.22	2.6	1.55	1.76	1.65	0.62	2.36
							10^8 cyc	1.49	0.47	0.69	0.45	0.48	0.52	0.35	0.37	1.07	0.6
#62	SSC:36A	Skip Welded Plates	11.326	12.880	-5.163	0.46	10^3 cyc	0.77	2.1	2.46	0.75	1.59	0.95	1.08	1.01	0.38	1.45
							10^8 cyc	1.62	0.51	0.75	0.49	0.53	0.57	0.39	0.4	1.17	0.66
#63	SSC:38	Stiffener Plate Penetration: Bndg	9.128	10.170	-3.462	0.36	10^3 cyc	0.48	1.3	1.52	0.46	0.99	0.59	0.67	0.63	0.24	0.9
							10^8 cyc	3.01	0.95	1.39	0.91	0.98	1.06	0.72	0.75	2.16	1.21
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	14.312	17.390	-10.225	0.88	10^3 cyc	3.14	8.55	10.01	3.04	6.48	3.87	4.4	4.11	1.55	5.89
							10^8 cyc	2.19	0.69	1.01	0.66	0.71	0.77	0.52	0.55	1.57	0.88
#65	SSC:40	Stiffener Intersection: Bending	8.646	9.710	-3.533	0.62	10^3 cyc	0.71	1.94	2.28	0.69	1.47	0.88	1	0.94	0.35	1.34
							10^8 cyc	4.2	1.32	1.94	1.27	1.37	1.47	1	1.05	3.02	1.7
#66	SSC:42	Bending of Long Attachment	14.765	16.980	-7.358	0.83	10^3 cyc	0.9	2.44	2.86	0.87	1.85	1.1	1.26	1.17	0.44	1.68
							10^8 cyc	0.97	0.3	0.45	0.29	0.32	0.34	0.23	0.24	0.7	0.39
#67	SSC:46	Long. Welds on Support Gussets: Axial	9.361	10.670	-4.348	0.62	10^3 cyc	1.03	2.82	3.3	1	2.14	1.27	1.45	1.35	0.51	1.94
							10^8 cyc	3.3	1.04	1.53	1	1.08	1.16	0.79	0.82	2.38	1.33
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.781	10.930	-3.818	0.07	10^3 cyc	0.48	1.32	1.54	0.47	1	0.6	0.68	0.63	0.24	0.91
							10^8 cyc	2.23	0.7	1.03	0.68	0.73	0.78	0.53	0.56	1.61	0.9
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bnd	10.023	11.240	-4.042	0.19	10^3 cyc	0.54	1.46	1.71	0.52	1.11	0.66	0.75	0.7	0.27	1.01
							10^8 cyc	2.1	0.66	0.97	0.64	0.68	0.74	0.5	0.52	1.51	0.85
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.27	0.74	0.86	0.26	0.56	0.33	0.38	0.35	0.13	0.51
							10^8 cyc	2.84	0.89	1.31	0.86	0.93	1	0.68	0.71	2.05	1.15

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #61	#62	#63	#64	#65	#66	#67	#68	#69	#70
#1	SSC:1(all steels)	Baseplate	13.825	15.550	-5.729	0.75	10^3 cyc	0.34	0.55	0.88	0.13	0.59	0.47	0.41	0.87	0.78	1.56
							10^8 cyc	0.48	0.44	0.24	0.33	0.17	0.73	0.22	0.32	0.34	0.25
#2	SSC:1M	Baseplate Mild Steel	21.679	25.360	-12.229	0.71	10^3 cyc	1.01	1.65	2.67	0.41	1.79	1.42	1.23	2.63	2.37	4.71
							10^8 cyc	0.5	0.46	0.25	0.34	0.18	0.76	0.22	0.33	0.35	0.26
#3	SSC:1H	Baseplate HSLA Steel	27.389	32.040	-15.449	0.91	10^3 cyc	0.99	1.61	2.6	0.4	1.74	1.39	1.2	2.57	2.31	4.59
							10^8 cyc	0.4	0.36	0.2	0.27	0.14	0.61	0.18	0.27	0.28	0.21
#4	SSC:1Q	Baseplate Q & T Steel	13.345	14.910	-5.199	0.68	10^3 cyc	0.26	0.42	0.68	0.1	0.45	0.36	0.31	0.67	0.6	1.2
							10^8 cyc	0.45	0.41	0.22	0.31	0.16	0.69	0.2	0.3	0.32	0.24
#5	SSC:1(F)	Baseplate Flame Cut	12.334	13.780	-4.805	0.60	10^3 cyc	0.28	0.46	0.74	0.11	0.49	0.39	0.34	0.73	0.66	1.3
							10^8 cyc	0.59	0.54	0.29	0.4	0.21	0.91	0.27	0.39	0.42	0.31
#6	SSC:2	Rolled I-Beam Bending	13.999	15.820	-6.048	0.64	10^3 cyc	0.4	0.65	1.06	0.16	0.71	0.56	0.49	1.04	0.94	1.87
							10^8 cyc	0.52	0.47	0.26	0.35	0.18	0.79	0.23	0.34	0.37	0.27
#7	SSC:3	Longitudinal Seam	13.010	14.800	-5.946	0.63	10^3 cyc	0.55	0.89	1.44	0.22	0.96	0.77	0.66	1.42	1.28	2.53
							10^8 cyc	0.72	0.66	0.36	0.49	0.26	1.11	0.33	0.48	0.51	0.38
#8	SSC:3(G)	Ground Long. Seam	13.602	15.520	-6.370	0.74	10^3 cyc	0.58	0.95	1.54	0.23	1.03	0.82	0.71	1.52	1.36	2.71
							10^8 cyc	0.68	0.62	0.34	0.46	0.24	1.04	0.31	0.45	0.48	0.36
#9	SSC:4	Long. Fillet Weld Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	0.54	0.88	1.42	0.22	0.95	0.76	0.66	1.41	1.27	2.51
							10^8 cyc	0.79	0.72	0.39	0.54	0.28	1.21	0.36	0.53	0.56	0.41
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	8.663	9.650	-3.278	0.48	10^3 cyc	0.41	0.67	1.09	0.17	0.73	0.58	0.5	1.07	0.97	1.92
							10^8 cyc	2.65	2.42	1.31	1.8	0.94	4.06	1.19	1.76	1.87	1.38
#11	SSC:6	Dbl I-Bm Bndg	12.515	14.220	-5.663	0.61	10^3 cyc	0.54	0.88	1.42	0.22	0.95	0.76	0.66	1.41	1.27	2.51
							10^8 cyc	0.79	0.72	0.39	0.54	0.28	1.21	0.36	0.53	0.56	0.41
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	10.095	11.230	-3.771	0.53	10^3 cyc	0.3	0.49	0.79	0.12	0.53	0.42	0.37	0.78	0.7	1.4
							10^8 cyc	1.22	1.12	0.6	0.83	0.43	1.87	0.55	0.81	0.86	0.64
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	10.204	11.460	-4.172	0.51	10^3 cyc	0.44	0.72	1.16	0.18	0.78	0.62	0.54	1.15	1.03	2.05
							10^8 cyc	1.34	1.22	0.66	0.91	0.47	2.05	0.6	0.89	0.95	0.7
#14	SSC:8	Bolted Double Lap	14.469	16.440	-6.549	0.81	10^3 cyc	0.48	0.79	1.27	0.19	0.85	0.68	0.59	1.25	1.13	2.24
							10^8 cyc	0.54	0.49	0.26	0.36	0.19	0.82	0.24	0.36	0.38	0.28
#15	SSC:9	Riveted Single Lap	16.687	19.590	-9.643	0.90	10^3 cyc	1.19	1.93	3.13	0.48	2.09	1.67	1.44	3.08	2.78	5.51
							10^8 cyc	0.75	0.69	0.37	0.51	0.27	1.15	0.34	0.5	0.53	0.39
#16	SSC:10M	Butt Weld Axial:Mild Steel	14.345	16.630	-7.589	0.88	10^3 cyc	0.91	1.49	2.41	0.37	1.61	1.28	1.11	2.38	2.14	4.25
							10^8 cyc	0.8	0.73	0.39	0.54	0.28	1.22	0.36	0.53	0.57	0.42
#17	SSC:10H	Butt Weld Axial:HSLA Steel	22.068	25.920	-12.795	0.96	10^3 cyc	1.12	1.83	2.96	0.45	1.98	1.58	1.37	2.92	2.63	5.22
							10^8 cyc	0.53	0.48	0.26	0.36	0.19	0.81	0.24	0.35	0.37	0.28
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	12.108	13.650	-5.124	0.76	10^3 cyc	0.42	0.68	1.1	0.17	0.74	0.59	0.51	1.09	0.98	1.94
							10^8 cyc	0.76	0.69	0.38	0.51	0.27	1.16	0.34	0.5	0.54	0.4
#19	SSC:10(G)	Butt Weld Axial:Ground	14.784	16.930	-7.130	0.94	10^3 cyc	0.62	1.01	1.64	0.25	1.1	0.87	0.76	1.62	1.46	2.89
							10^8 cyc	0.6	0.55	0.3	0.41	0.21	0.92	0.27	0.4	0.42	0.31
#20	SSC:10A	Butt Weld Bndg	12.494	14.140	-5.468	0.79	10^3 cyc	0.47	0.77	1.24	0.19	0.83	0.66	0.57	1.22	1.1	2.18
							10^8 cyc	0.74	0.68	0.37	0.5	0.26	1.13	0.33	0.49	0.52	0.39
#21	SSC:11	I-Bm Butt Weld Bndg	12.035	13.770	-5.765	0.68	10^3 cyc	0.71	1.15	1.86	0.28	1.24	0.99	0.86	1.83	1.65	3.28
							10^8 cyc	1	0.91	0.49	0.68	0.35	1.53	0.45	0.66	0.7	0.52
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	10.366	11.690	-4.398	0.43	10^3 cyc	0.51	0.82	1.33	0.2	0.89	0.71	0.62	1.32	1.18	2.35
							10^8 cyc	1.33	1.22	0.66	0.9	0.47	2.04	0.6	0.88	0.94	0.69
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	12.415	14.120	-5.663	0.60	10^3 cyc	0.56	0.92	1.48	0.23	0.99	0.79	0.69	1.46	1.32	2.62
							10^8 cyc	0.82	0.75	0.41	0.56	0.29	1.26	0.37	0.55	0.58	0.43
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	10.847	12.120	-4.229	0.45	10^3 cyc	0.33	0.54	0.87	0.13	0.58	0.46	0.4	0.86	0.77	1.53
							10^8 cyc	0.96	0.88	0.48	0.65	0.34	1.47	0.43	0.64	0.68	0.5
#25	SSC:14	Disc. Cruciform Axial	14.721	16.960	-7.439	0.91	10^3 cyc	0.75	1.23	1.99	0.3	1.33	1.06	0.92	1.96	1.76	3.5
							10^8 cyc	0.68	0.62	0.34	0.46	0.24	1.04	0.31	0.45	0.48	0.35
#26	SSC:15	Loaded Edge Attachment Plate	9.566	10.830	-4.200	0.43	10^3 cyc	0.65	1.05	1.7	0.26	1.14	0.91	0.79	1.68	1.51	3
							10^8 cyc	1.92	1.75	0.95	1.3	0.68	2.94	0.86	1.28	1.36	1
#27	SSC:16	Partial Pen. Butt Weld	10.626	12.020	-4.631	0.58	10^3 cyc	0.55	0.89	1.44	0.22	0.97	0.77	0.67	1.43	1.28	2.55
							10^8 cyc	1.26	1.15	0.62	0.86	0.45	1.94	0.57	0.84	0.89	0.66
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	13.455	15.550	-6.960	0.95	10^3 cyc	0.87	1.42	2.3	0.35	1.54	1.23	1.06	2.27	2.04	4.06
							10^8 cyc	0.87	0.8	0.43	0.59	0.31	1.34	0.39	0.58	0.62	0.46
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	9.265	10.390	-3.736	0.34	10^3 cyc	0.48	0.78	1.27	0.19	0.85	0.67	0.58	1.25	1.12	2.23
							10^8 cyc	2	1.84	0.99	1.36	0.71	3.08	0.9	1.33	1.42	1.05
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	1.13	1.85	2.99	0.45	2	1.59	1.38	2.95	2.65	5.27
							10^8 cyc	0.95	0.87	0.47	0.65	0.34	1.46	0.43	0.63	0.67	0.5
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	9.097	10.140	-3.465	0.39	10^3 cyc	0.39	0.63	1.02	0.16	0.69	0.55	0.47	1.01	0.91	1.81
							10^8 cyc	2.07	1.89	1.02	1.4	0.73	3.17	0.93	1.37	1.46	1.08
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.65	10^3 cyc	1.13	1.85	2.99	0.45	2	1.59	1.38	2.95	2.65	5.27
							10^8 cyc	0.95	0.87	0.47	0.65	0.34	1.46	0.43	0.63	0.67	0.5
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	9.048	10.260	-4.027	0.65	10^3 cyc	0.73	1.2	1.93	0.29	1.29	1.03	0.89	1.91	1.72	3.41
							10^8 cyc	2.45	2.25	1.21	1.67	0.87	3.76	1.1	1.63	1.74	1.28
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	15.241	18.020	-9.233	0.75	10^3 cyc	1.45	2.36	3.82	0.58	2.55	2.03	1.76	3.77	3.39	6.73
							10^8 cyc	0.97	0.88	0.48	0.66	0.34	1.48	0.43	0.64	0.68	0.5
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	12.941	15.190	-7.472	0.93	10^3 cyc	1.33	2.17	3.5	0.53	2.34	1.87	1.62	3.45	3.11	6.17
							10^8 cyc	1.19	1.09	0.59	0.81	0.42	1.82	0.53	0.79	0.84	0.62

	BASELINE CONFIGURATION		LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #61	#62	#63	#64	#65	#66	#67	#68	#69	#70
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	13.566	15.830	-7.520	0.93	10^3 cyc	1.12	1.83	2.95	0.45	1.98	1.57	1.36	2.91	2.62	5.21
							10^8 cyc	0.99	0.91	0.49	0.87	0.35	1.52	0.45	0.66	0.7	0.52
#37	SSC:20	Plate Penetration: Axial	10.180	11.570	-4.619	0.66	10^3 cyc	0.68	1.1	1.79	0.27	1.19	0.95	0.82	1.76	1.59	3.15
							10^8 cyc	1.57	1.44	0.78	1.07	0.56	2.41	0.71	1.04	1.11	0.82
#38	SSC:20(S)	Plate Penetration: Shear	12.695	14.730	-6.759	0.93	10^3 cyc	1.01	1.65	2.66	0.4	1.78	1.42	1.23	2.63	2.38	4.69
							10^8 cyc	1.06	0.97	0.53	0.72	0.38	1.63	0.48	0.71	0.75	0.56
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	22.432	26.720	-14.245	0.62	10^3 cyc	1.57	2.55	4.13	0.63	2.76	2.2	1.91	4.07	3.67	7.28
							10^8 cyc	0.67	0.62	0.33	0.46	0.24	1.03	0.3	0.45	0.48	0.35
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	20.826	25.490	-15.494	0.62	10^3 cyc	2.65	4.32	6.98	1.06	4.67	3.72	3.23	6.89	6.2	12.32
							10^8 cyc	1.07	0.98	0.53	0.72	0.38	1.64	0.48	0.71	0.76	0.56
#41	SSC:21(S)	Plate Penetration: Shear	14.765	16.980	-7.358	0.83	10^3 cyc	0.71	1.16	1.88	0.29	1.26	1	0.87	1.85	1.67	3.31
							10^8 cyc	0.65	0.6	0.32	0.44	0.23	1	0.29	0.43	0.46	0.34
#42	SSC:22	Tee with Stud Attachment: Bndg	9.093	10.040	-3.147	0.32	10^3 cyc	0.25	0.41	0.67	0.1	0.45	0.35	0.31	0.66	0.59	1.17
							10^8 cyc	1.88	1.72	0.93	1.27	0.66	2.88	0.84	1.25	1.33	0.98
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.29	0.47	0.77	0.12	0.51	0.41	0.35	0.75	0.68	1.35
							10^8 cyc	2.06	1.89	1.02	1.4	0.73	3.16	0.93	1.37	1.46	1.08
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.981	9.940	-3.187	0.13	10^3 cyc	0.29	0.47	0.77	0.12	0.51	0.41	0.35	0.75	0.68	1.35
							10^8 cyc	2.06	1.89	1.02	1.4	0.73	3.16	0.93	1.37	1.46	1.08
#45	SSC:25	Continuous Cruciform	13.658	15.790	-7.090	0.78	10^3 cyc	0.88	1.43	2.31	0.35	1.55	1.23	1.07	2.28	2.05	4.07
							10^8 cyc	0.85	0.78	0.42	0.58	0.3	1.31	0.38	0.57	0.6	0.45
#46	SSC:25A	Plate with Transv. Side Attachment	16.906	19.470	-8.518	0.91	10^3 cyc	0.69	1.13	1.83	0.28	1.22	0.97	0.85	1.8	1.62	3.23
							10^8 cyc	0.51	0.47	0.25	0.35	0.18	0.79	0.23	0.34	0.36	0.27
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	13.053	15.150	-6.966	0.63	10^3 cyc	1	1.63	2.63	0.4	1.76	1.4	1.22	2.6	2.34	4.65
							10^8 cyc	1	0.92	0.49	0.68	0.35	1.53	0.45	0.67	0.71	0.52
#48	SSC:26	Welded Cover Plate	9.122	10.130	-3.348	0.61	10^3 cyc	0.33	0.54	0.87	0.13	0.58	0.46	0.4	0.85	0.77	1.53
							10^8 cyc	1.96	1.8	0.97	1.33	0.69	3.01	0.88	1.3	1.39	1.03
#49	SSC:27	Double Lapped Plate with Plug Welds	8.453	9.400	-3.146	0.58	10^3 cyc	0.4	0.66	1.06	0.16	0.71	0.57	0.49	1.05	0.94	1.87
							10^8 cyc	3	2.74	1.48	2.03	1.06	4.59	1.35	1.99	2.12	1.57
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	10.471	12.060	-5.277	0.54	10^3 cyc	0.97	1.58	2.56	0.39	1.71	1.36	1.18	2.53	2.27	4.52
							10^8 cyc	1.65	1.51	0.82	1.12	0.58	2.53	0.74	1.1	1.17	0.86
#51	SSC:28	Baseplate with Circular Hole	15.078	17.410	-7.746	0.81	10^3 cyc	0.79	1.29	2.09	0.32	1.4	1.12	0.97	2.06	1.86	3.69
							10^8 cyc	0.67	0.62	0.33	0.46	0.24	1.03	0.3	0.45	0.48	0.35
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.919	9.870	-3.159	0.31	10^3 cyc	0.29	0.48	0.77	0.12	0.51	0.41	0.36	0.76	0.68	1.36
							10^8 cyc	2.14	1.96	1.06	1.45	0.76	3.28	0.96	1.42	1.51	1.12
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.566	10.580	-3.368	0.10	10^3 cyc	0.25	0.41	0.66	0.1	0.44	0.35	0.3	0.65	0.58	1.16
							10^8 cyc	1.46	1.33	0.72	0.99	0.52	2.23	0.66	0.97	1.03	0.76
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	9.361	10.670	-4.348	0.62	10^3 cyc	0.82	1.34	2.16	0.33	1.45	1.15	1	2.14	1.92	3.82
							10^8 cyc	2.22	2.03	1.1	1.51	0.79	3.41	1	1.48	1.57	1.16
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	9.091	10.130	-3.453	0.44	10^3 cyc	0.38	0.63	1.01	0.15	0.68	0.54	0.47	1	0.9	1.79
							10^8 cyc	2.07	1.89	1.02	1.4	0.73	3.17	0.93	1.38	1.46	1.08
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	9.566	10.830	-4.200	0.43	10^3 cyc	0.65	1.05	1.7	0.26	1.14	0.91	0.79	1.68	1.51	3
							10^8 cyc	1.92	1.75	0.95	1.3	0.68	2.94	0.86	1.28	1.36	1
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	8.646	9.710	-3.533	0.62	10^3 cyc	0.57	0.92	1.49	0.23	1	0.8	0.69	1.47	1.33	2.64
							10^8 cyc	2.83	2.59	1.4	1.92	1	4.33	1.27	1.88	2	1.48
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	8.758	9.860	-3.660	0.50	10^3 cyc	0.61	0.99	1.6	0.24	1.07	0.85	0.74	1.58	1.42	2.82
							10^8 cyc	2.7	2.47	1.33	1.83	0.95	4.14	1.21	1.8	1.91	1.41
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	16.469	19.590	-10.368	0.81	10^3 cyc	1.61	2.62	4.24	0.64	2.84	2.26	1.96	4.18	3.76	7.47
							10^8 cyc	0.94	0.86	0.46	0.63	0.33	1.43	0.42	0.62	0.66	0.49
#60	SSC:35	Butt Weld with Backing Bar	9.604	10.750	-3.808	0.28	10^3 cyc	0.42	0.69	1.12	0.17	0.75	0.59	0.52	1.1	0.99	1.97
							10^8 cyc	1.67	1.53	0.82	1.13	0.59	2.56	0.75	1.11	1.18	0.87
#61	SSC:36	Skip Welded Plates with Rathole	13.053	15.150	-6.966	0.63	10^3 cyc	1	1.63	2.63	0.4	1.76	1.4	1.22	2.6	2.34	4.65
							10^8 cyc	1	0.92	0.49	0.68	0.35	1.53	0.45	0.67	0.71	0.52
#62	SSC:36A	Skip Welded Plates	11.326	12.880	-5.163	0.46	10^3 cyc	0.61	1	1.62	0.25	1.08	0.86	0.75	1.59	1.44	2.85
							10^8 cyc	1.09	1	0.54	0.74	0.39	1.68	0.49	0.73	0.77	0.57
#63	SSC:38	Stiffener Plate Penetration: Bndg	9.128	10.170	-3.462	0.36	10^3 cyc	0.38	0.62	1	0.15	0.67	0.53	0.46	0.99	0.89	1.76
							10^8 cyc	2.02	1.85	1	1.37	0.72	3.1	0.91	1.35	1.43	1.06
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	14.312	17.390	-10.225	0.88	10^3 cyc	2.49	4.07	6.57	1	4.4	3.5	3.04	6.48	5.84	11.59
							10^8 cyc	1.47	1.35	0.73	1	0.52	2.26	0.66	0.98	1.04	0.77
#65	SSC:40	Stiffener Intersection: Bending	8.646	9.710	-3.533	0.62	10^3 cyc	0.57	0.92	1.49	0.23	1	0.8	0.69	1.47	1.33	2.64
							10^8 cyc	2.83	2.59	1.4	1.92	1	4.33	1.27	1.88	2	1.48
#66	SSC:42	Bending of Long Attachment	14.765	16.980	-7.358	0.83	10^3 cyc	0.71	1.16	1.88	0.29	1.26	1	0.87	1.85	1.67	3.31
							10^8 cyc	0.65	0.6	0.32	0.44	0.23	1	0.29	0.43	0.46	0.34
#67	SSC:46	Long. Welds on Support Gussets: Axial	9.361	10.670	-4.348	0.62	10^3 cyc	0.82	1.34	2.16	0.33	1.45	1.15	1	2.14	1.92	3.82
							10^8 cyc	2.22	2.03	1.1	1.51	0.79	3.41	1	1.48	1.57	1.16
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.781	10.930	-3.818	0.07	10^3 cyc	0.38	0.63	1.01	0.15	0.68	0.54	0.47	1	0.9	1.79
							10^8 cyc	1.5	1.38	0.74	1.02	0.53	2.31	0.68	1	1.06	0.79
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bnd	10.023	11.240	-4.042	0.19	10^3 cyc	0.43	0.7	1.13	0.17	0.75	0.6	0.52	1.11	1	1.99
							10^8 cyc	1.41	1.29	0.7	0.96	0.5	2.17	0.64	0.94	1	0.74
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.22	0.35	0.57	0.09	0.38	0.3	0.26	0.56	0.5	1
							10^8 cyc	1.91	1.75	0.95	1.3	0.68	2.93	0.86	1.27	1.35	1

SSC-318 (Munse Test Specimen Data) RMS Fatigue Strength Ratios Associated with a 2.3% Probability of Failure

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #1	#2	#3	#4	#5	#6	#7	#8	#9	#10
#1	SSC:1(all steels)	Baseplate	12.325	14.050	-5.729	0.75	10^3 cyc	1	0.46	0.47	1.3	1.23	0.94	0.69	0.62	0.69	0.76
							10^8 cyc	1	1.35	1.67	1.06	0.83	1.04	0.74	0.75	0.67	0.17
#2	SSC:1M	Baseplate Mild Steel	20.259	23.940	-12.229	0.71	10^3 cyc	2.16	1	1.02	2.81	2.65	2.02	1.49	1.33	1.49	1.63
							10^8 cyc	0.74	1	1.24	0.79	0.62	0.77	0.55	0.56	0.5	0.13
#3	SSC:1H	Baseplate HSLA Steel	25.569	30.220	-15.449	0.91	10^3 cyc	2.12	0.98	1	2.75	2.6	1.98	1.46	1.3	1.46	1.6
							10^8 cyc	0.6	0.8	1	0.63	0.5	0.62	0.44	0.45	0.4	0.1
#4	SSC:1Q	Baseplate Q & T Steel	11.985	13.550	-5.199	0.68	10^3 cyc	0.77	0.36	0.36	1	0.94	0.72	0.53	0.47	0.53	0.58
							10^8 cyc	0.94	1.27	1.58	1	0.79	0.98	0.7	0.71	0.64	0.16
#5	SSC:1(F)	Baseplate Flame Cut	11.134	12.580	-4.805	0.60	10^3 cyc	0.81	0.38	0.38	1.06	1	0.76	0.56	0.5	0.56	0.62
							10^8 cyc	1.2	1.61	2.01	1.27	1	1.25	0.89	0.9	0.81	0.2
#6	SSC:2	Rolled I-Beam Bending	12.719	14.540	-6.048	0.64	10^3 cyc	1.07	0.49	0.5	1.39	1.31	1	0.74	0.66	0.74	0.81
							10^8 cyc	0.96	1.29	1.61	1.02	0.8	1	0.71	0.72	0.65	0.16
#7	SSC:3	Longitudinal Seam	11.750	13.540	-5.946	0.63	10^3 cyc	1.45	0.67	0.69	1.89	1.78	1.36	1	0.89	1	1.1
							10^8 cyc	1.35	1.81	2.26	1.43	1.12	1.4	1	1.02	0.91	0.23
#8	SSC:3(G)	Ground Long. Seam	12.122	14.040	-6.370	0.74	10^3 cyc	1.63	0.75	0.77	2.11	2	1.52	1.12	1	1.12	1.23
							10^8 cyc	1.33	1.79	2.22	1.41	1.11	1.38	0.99	1	0.89	0.22
#9	SSC:4	Long. Fillet Weld Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	1.45	0.67	0.69	1.88	1.78	1.36	1	0.89	1	1.1
							10^8 cyc	1.48	2	2.48	1.57	1.24	1.55	1.1	1.12	1	0.25
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	7.703	8.690	-3.278	0.48	10^3 cyc	1.32	0.61	0.62	1.72	1.62	1.24	0.91	0.81	0.91	1
							10^8 cyc	5.94	8	9.94	6.29	4.96	6.18	4.41	4.47	4	1
#11	SSC:6	Dbl I-Bm Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	1.45	0.67	0.69	1.88	1.78	1.36	1	0.89	1	1.1
							10^8 cyc	1.48	2	2.48	1.57	1.24	1.55	1.1	1.12	1	0.25
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	9.035	10.170	-3.771	0.53	10^3 cyc	0.94	0.43	0.44	1.22	1.15	0.88	0.65	0.58	0.65	0.71
							10^8 cyc	2.66	3.59	4.46	2.82	2.22	2.77	1.98	2.01	1.79	0.45
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	9.184	10.440	-4.172	0.51	10^3 cyc	1.27	0.59	0.6	1.65	1.56	1.19	0.87	0.78	0.87	0.96
							10^8 cyc	2.68	3.61	4.49	2.84	2.24	2.79	1.99	2.02	1.81	0.45
#14	SSC:8	Bolted Double Lap	12.849	14.820	-6.549	0.81	10^3 cyc	1.39	0.64	0.66	1.81	1.71	1.3	0.96	0.86	0.96	1.05
							10^8 cyc	1.08	1.46	1.81	1.15	0.9	1.13	0.8	0.81	0.73	0.18
#15	SSC:9	Riveted Single Lap	14.887	17.790	-9.643	0.90	10^3 cyc	2.98	1.38	1.41	3.87	3.66	2.79	2.05	1.83	2.05	2.25
							10^8 cyc	1.32	1.77	2.2	1.4	1.1	1.37	0.98	0.99	0.89	0.22
#16	SSC:10M	Butt Weld Axial:Mild Steel	12.585	14.870	-7.589	0.88	10^3 cyc	2.55	1.18	1.2	3.31	3.13	2.39	1.76	1.57	1.76	1.93
							10^8 cyc	1.56	2.1	2.61	1.65	1.3	1.62	1.15	1.17	1.05	0.26
#17	SSC:10H	Butt Weld Axial:HSLA Steel	20.148	24.000	-12.795	0.96	10^3 cyc	2.59	1.2	1.22	3.37	3.18	2.43	1.79	1.59	1.79	1.96
							10^8 cyc	0.85	1.15	1.43	0.9	0.71	0.89	0.63	0.64	0.58	0.14
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	10.588	12.130	-5.124	0.76	10^3 cyc	1.35	0.63	0.64	1.76	1.66	1.27	0.93	0.83	0.93	1.02
							10^8 cyc	1.72	2.31	2.87	1.82	1.43	1.79	1.27	1.29	1.16	0.29
#19	SSC:10(G)	Butt Weld Axial:Ground	12.904	15.050	-7.130	0.94	10^3 cyc	1.86	0.86	0.88	2.42	2.29	1.75	1.29	1.15	1.29	1.41
							10^8 cyc	1.26	1.69	2.1	1.33	1.05	1.31	0.93	0.95	0.85	0.21
#20	SSC:10A	Butt Weld Bndg	10.914	12.560	-5.468	0.79	10^3 cyc	1.49	0.69	0.71	1.94	1.83	1.4	1.03	0.92	1.03	1.13
							10^8 cyc	1.64	2.21	2.75	1.74	1.37	1.71	1.22	1.24	1.11	0.28
#21	SSC:11	I-Bm Butt Weld Bndg	10.675	12.410	-5.765	0.68	10^3 cyc	1.98	0.92	0.94	2.58	2.44	1.86	1.37	1.22	1.37	1.5
							10^8 cyc	1.96	2.64	3.28	2.07	1.63	2.04	1.45	1.47	1.32	0.33
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	9.506	10.830	-4.398	0.43	10^3 cyc	1.3	0.6	0.61	1.69	1.59	1.21	0.89	0.8	0.89	0.98
							10^8 cyc	2.38	3.21	3.99	2.52	1.99	2.48	1.77	1.79	1.6	0.4
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	11.215	12.920	-5.663	0.60	10^3 cyc	1.5	0.69	0.71	1.95	1.84	1.4	1.03	0.92	1.03	1.13
							10^8 cyc	1.53	2.07	2.57	1.62	1.28	1.6	1.14	1.15	1.03	0.26
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	9.947	11.220	-4.229	0.45	10^3 cyc	0.88	0.41	0.42	1.14	1.08	0.82	0.61	0.54	0.61	0.67
							10^8 cyc	1.79	2.42	3	1.9	1.5	1.87	1.33	1.35	1.21	0.3
#25	SSC:14	Disc. Cruciform Axial	12.901	15.140	-7.439	0.91	10^3 cyc	2.16	1	1.02	2.81	2.66	2.03	1.49	1.33	1.49	1.64
							10^8 cyc	1.36	1.84	2.28	1.44	1.14	1.42	1.01	1.03	0.92	0.23
#26	SSC:15	Loaded Edge Attachment Plate	8.706	9.970	-4.200	0.43	10^3 cyc	1.69	0.78	0.8	2.2	2.07	1.58	1.16	1.04	1.16	1.28
							10^8 cyc	3.51	4.73	5.87	3.72	2.93	3.65	2.6	2.64	2.36	0.59
#27	SSC:16	Partial Pen. Butt Weld	9.466	10.860	-4.631	0.58	10^3 cyc	1.59	0.74	0.75	2.07	1.96	1.49	1.1	0.98	1.1	1.21
							10^8 cyc	2.57	3.46	4.3	2.72	2.14	2.67	1.9	1.93	1.73	0.43
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	11.555	13.650	-6.960	0.95	10^3 cyc	2.67	1.24	1.26	3.47	3.28	2.5	1.84	1.64	1.84	2.02
							10^8 cyc	1.87	2.52	3.13	1.98	1.56	1.95	1.39	1.41	1.26	0.32
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	8.585	9.710	-3.736	0.34	10^3 cyc	1.19	0.55	0.56	1.55	1.46	1.12	0.82	0.73	0.82	0.9
							10^8 cyc	3.48	4.69	5.83	3.69	2.91	3.63	2.59	2.62	2.35	0.59
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	2.72	1.26	1.29	3.54	3.34	2.55	1.88	1.67	1.88	2.06
							10^8 cyc	1.6	2.16	2.68	1.7	1.34	1.67	1.19	1.21	1.08	0.27
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	8.317	9.360	-3.465	0.39	10^3 cyc	1.07	0.49	0.5	1.39	1.31	1	0.74	0.66	0.74	0.81
							10^8 cyc	3.96	5.34	6.64	4.2	3.31	4.13	2.94	2.99	2.67	0.67
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	2.72	1.26	1.29	3.54	3.34	2.55	1.88	1.67	1.88	2.06
							10^8 cyc	1.6	2.16	2.68	1.7	1.34	1.67	1.19	1.21	1.08	0.27
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	7.748	8.960	-4.027	0.65	10^3 cyc	2.52	1.17	1.19	3.28	3.1	2.36	1.74	1.55	1.74	1.91
							10^8 cyc	5.9	7.94	9.87	6.25	4.92	6.14	4.37	4.44	3.97	0.99
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	13.741	16.520	-9.233	0.75	10^3 cyc	3.44	1.59	1.63	4.47	4.22	3.22	2.37	2.12	2.37	2.6
							10^8 cyc	1.6	2.16	2.68	1.7	1.34	1.67	1.19	1.21	1.08	0.27
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	11.081	13.330	-7.472	0.93	10^3 cyc	3.85	1.78	1.82	5	4.73	3.6	2.65	2.37	2.65	2.91
							10^8 cyc	2.41	3.24	4.03	2.55	2.01	2.51	1.79	1.81	1.62	0.41

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #1	#2	#3	#4	#5	#6	#7	#8	#9	#10
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	11.706	13.970	-7.520	0.93	10^3 cyc	3.24	1.5	1.53	4.21	3.97	3.03	2.23	1.99	2.23	2.45
							10^8 cyc	2	2.7	3.36	2.12	1.67	2.09	1.49	1.51	1.35	0.34
#37	SSC:20	Plate Penetration: Axial	8.860	10.250	-4.619	0.66	10^3 cyc	2.14	0.99	1.01	2.76	2.62	2	1.47	1.31	1.47	1.62
							10^8 cyc	3.46	4.66	5.8	3.67	2.89	3.61	2.57	2.61	2.33	0.58
#38	SSC:20(S)	Plate Penetration: Shear	10.835	12.870	-6.759	0.93	10^3 cyc	3.11	1.44	1.47	4.04	3.82	2.91	2.14	1.91	2.14	2.35
							10^8 cyc	2.29	3.08	3.83	2.42	1.91	2.38	1.7	1.72	1.54	0.39
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	21.192	25.480	-14.245	0.62	10^3 cyc	3.13	1.45	1.48	4.06	3.84	2.93	2.16	1.92	2.16	2.38
							10^8 cyc	0.94	1.27	1.57	1	0.78	0.98	0.7	0.71	0.63	0.16
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	19.586	24.250	-15.494	0.62	10^3 cyc	5.2	2.41	2.46	6.77	6.39	4.87	3.59	3.2	3.59	3.94
							10^8 cyc	1.47	1.97	2.45	1.55	1.22	1.53	1.09	1.1	0.99	0.25
#41	SSC:21(S)	Plate Penetration: Shear	13.105	15.320	-7.358	0.83	10^3 cyc	1.95	0.9	0.92	2.54	2.4	1.83	1.35	1.2	1.35	1.48
							10^8 cyc	1.25	1.69	2.1	1.33	1.05	1.3	0.93	0.94	0.84	0.21
#42	SSC:22	Tee with Stud Attachment: Bndg	8.453	9.400	-3.147	0.32	10^3 cyc	0.66	0.3	0.31	0.86	0.81	0.62	0.45	0.41	0.45	0.5
							10^8 cyc	3.42	4.61	5.73	3.63	2.86	3.57	2.54	2.58	2.31	0.58
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.57	0.26	0.27	0.74	0.7	0.54	0.39	0.35	0.39	0.43
							10^8 cyc	2.84	3.83	4.76	3.01	2.37	2.96	2.11	2.14	1.91	0.48
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.57	0.26	0.27	0.74	0.7	0.54	0.39	0.35	0.39	0.43
							10^8 cyc	2.84	3.83	4.76	3.01	2.37	2.96	2.11	2.14	1.91	0.48
#45	SSC:25	Continuous Cruciform	12.096	14.230	-7.090	0.78	10^3 cyc	2.38	1.1	1.12	3.09	2.92	2.23	1.64	1.46	1.64	1.8
							10^8 cyc	1.62	2.18	2.7	1.71	1.35	1.68	1.2	1.22	1.09	0.27
#46	SSC:25A	Plate with Transv. Side Attachment	15.086	17.650	-8.518	0.91	10^3 cyc	1.85	0.86	0.88	2.41	2.28	1.74	1.28	1.14	1.28	1.4
							10^8 cyc	0.96	1.29	1.61	1.02	0.8	1	0.71	0.72	0.65	0.16
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	11.793	13.890	-6.966	0.63	10^3 cyc	2.48	1.15	1.17	3.22	3.04	2.32	1.71	1.52	1.71	1.87
							10^8 cyc	1.73	2.33	2.9	1.84	1.45	1.8	1.29	1.31	1.17	0.29
#48	SSC:26	Welded Cover Plate	7.902	8.910	-3.348	0.61	10^3 cyc	1.24	0.57	0.59	1.61	1.53	1.16	0.86	0.76	0.86	0.94
							10^8 cyc	5.19	6.98	8.68	5.49	4.33	5.4	3.85	3.91	3.49	0.87
#49	SSC:27	Double Lapped Plate with Plug Welds	7.293	8.240	-3.146	0.58	10^3 cyc	1.54	0.71	0.73	2	1.89	1.44	1.06	0.95	1.06	1.16
							10^8 cyc	8	10.78	13.39	8.48	6.68	8.33	5.94	6.03	5.39	1.35
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	9.391	10.980	-5.277	0.54	10^3 cyc	2.54	1.18	1.2	3.3	3.12	2.38	1.75	1.56	1.75	1.92
							10^8 cyc	3.02	4.07	5.05	3.2	2.52	3.14	2.24	2.27	2.03	0.51
#51	SSC:28	Baseplate with Circular Hole	13.458	15.790	-7.746	0.81	10^3 cyc	2.1	0.97	0.99	2.73	2.58	1.97	1.45	1.29	1.45	1.59
							10^8 cyc	1.24	1.68	2.08	1.32	1.04	1.3	0.92	0.94	0.84	0.21
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.299	9.250	-3.159	0.31	10^3 cyc	0.75	0.35	0.35	0.97	0.92	0.7	0.52	0.46	0.52	0.57
							10^8 cyc	3.84	5.17	6.43	4.07	3.2	4	2.85	2.89	2.59	0.65
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.366	10.380	-3.368	0.10	10^3 cyc	0.47	0.22	0.22	0.61	0.57	0.44	0.32	0.29	0.32	0.35
							10^8 cyc	1.91	2.57	3.19	2.02	1.59	1.99	1.42	1.44	1.29	0.32
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	8.121	9.430	-4.348	0.62	10^3 cyc	2.59	1.2	1.22	3.36	3.18	2.42	1.78	1.59	1.78	1.96
							10^8 cyc	4.9	6.59	8.2	5.19	4.09	5.1	3.63	3.69	3.3	0.82
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	8.211	9.250	-3.453	0.44	10^3 cyc	1.13	0.52	0.53	1.47	1.39	1.06	0.78	0.69	0.78	0.85
							10^8 cyc	4.25	5.72	7.11	4.5	3.54	4.42	3.15	3.2	2.86	0.72
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	8.706	9.970	-4.200	0.43	10^3 cyc	1.69	0.78	0.8	2.2	2.07	1.58	1.16	1.04	1.16	1.28
							10^8 cyc	3.51	4.73	5.87	3.72	2.93	3.65	2.6	2.64	2.36	0.59
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	7.406	8.470	-3.533	0.62	10^3 cyc	2.08	0.96	0.98	2.7	2.55	1.95	1.43	1.28	1.43	1.57
							10^8 cyc	7.24	9.76	12.13	7.68	6.05	7.54	5.38	5.46	4.88	1.22
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	7.758	8.860	-3.660	0.50	10^3 cyc	1.86	0.86	0.88	2.42	2.28	1.74	1.28	1.14	1.28	1.41
							10^8 cyc	5.78	7.79	9.68	6.13	4.83	6.02	4.29	4.36	3.9	0.97
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	14.849	17.970	-10.368	0.81	10^3 cyc	3.76	1.74	1.78	4.89	4.62	3.52	2.6	2.32	2.6	2.85
							10^8 cyc	1.53	2.06	2.56	1.62	1.28	1.59	1.14	1.15	1.03	0.26
#60	SSC:35	Butt Weld with Backing Bar	9.044	10.190	-3.808	0.28	10^3 cyc	0.97	0.45	0.46	1.26	1.19	0.91	0.67	0.6	0.67	0.73
							10^8 cyc	2.67	3.6	4.47	2.83	2.23	2.78	1.98	2.01	1.8	0.45
#61	SSC:36	Skip Welded Plates with Rathole	11.793	13.890	-6.966	0.63	10^3 cyc	2.48	1.15	1.17	3.22	3.04	2.32	1.71	1.52	1.71	1.87
							10^8 cyc	1.73	2.33	2.9	1.84	1.45	1.8	1.29	1.31	1.17	0.29
#62	SSC:36A	Skip Welded Plates	10.406	11.960	-5.163	0.46	10^3 cyc	1.51	0.7	0.71	1.96	1.85	1.41	1.04	0.93	1.04	1.14
							10^8 cyc	1.88	2.53	3.15	1.99	1.57	1.96	1.4	1.42	1.27	0.32
#63	SSC:38	Stiffener Plate Penetration: Bndg	8.408	9.450	-3.462	0.36	10^3 cyc	1	0.46	0.47	1.3	1.23	0.94	0.69	0.62	0.69	0.76
							10^8 cyc	3.73	5.02	6.24	3.95	3.11	3.88	2.77	2.81	2.51	0.63
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	12.552	15.630	-10.225	0.88	10^3 cyc	6.05	2.8	2.86	7.87	7.43	5.67	4.17	3.72	4.17	4.58
							10^8 cyc	2.5	3.37	4.19	2.65	2.09	2.6	1.86	1.88	1.69	0.42
#65	SSC:40	Stiffener Intersection: Bending	7.406	8.470	-3.533	0.62	10^3 cyc	2.08	0.96	0.98	2.7	2.55	1.95	1.43	1.28	1.43	1.57
							10^8 cyc	7.24	9.76	12.13	7.68	6.05	7.54	5.38	5.46	4.88	1.22
#66	SSC:42	Bending of Long Attachment	13.105	15.320	-7.358	0.83	10^3 cyc	1.95	0.9	0.92	2.54	2.4	1.83	1.35	1.2	1.35	1.48
							10^8 cyc	1.25	1.69	2.1	1.33	1.05	1.3	0.93	0.94	0.84	0.21
#67	SSC:46	Long. Welds on Support Gussets: Axial	8.121	9.430	-4.348	0.62	10^3 cyc	2.59	1.2	1.22	3.36	3.18	2.42	1.78	1.59	1.78	1.96
							10^8 cyc	4.9	6.59	8.2	5.19	4.09	5.1	3.63	3.69	3.3	0.82
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.841	10.790	-3.818	0.07	10^3 cyc	0.68	0.32	0.32	0.89	0.84	0.64	0.47	0.42	0.47	0.52
							10^8 cyc	1.87	2.52	3.13	1.98	1.56	1.95	1.39	1.41	1.26	0.31
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	9.843	10.860	-4.042	0.19	10^3 cyc	0.87	0.4	0.41	1.13	1.06	0.81	0.6	0.53	0.6	0.66
							10^8 cyc	2	2.7	3.35	2.12	1.67	2.09	1.49	1.51	1.35	0.34
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.35	0.16	0.17	0.46	0.43	0.33	0.24	0.22	0.24	0.27
							10^8 cyc	2.19	2.94	3.68	2.32	1.82	2.28	1.62	1.65	1.47	0.37

BASELINE CONFIGURATION			LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #11	#12	#13	#14	#15	#16	#17	#18	#19	#20
#1	SSC:1(all steels)	Baseplate	12.325	14.050	-5.729	0.75	10^3 cyc	0.69	1.07	0.79	0.72	0.34	0.39	0.39	0.74	0.54	0.67
							10^8 cyc	0.67	0.38	0.37	0.93	0.76	0.64	1.17	0.58	0.8	0.61
#2	SSC:1M	Baseplate Mild Steel	20.259	23.940	-12.229	0.71	10^3 cyc	1.49	2.3	1.7	1.55	0.73	0.85	0.83	1.6	1.16	1.45
							10^8 cyc	0.5	0.28	0.28	0.69	0.56	0.48	0.87	0.43	0.59	0.45
#3	SSC:1H	Baseplate HSLA Steel	25.569	30.220	-15.449	0.91	10^3 cyc	1.46	2.26	1.67	1.52	0.71	0.83	0.82	1.56	1.13	1.42
							10^8 cyc	0.4	0.22	0.22	0.55	0.45	0.38	0.7	0.35	0.48	0.38
#4	SSC:1Q	Baseplate Q & T Steel	11.985	13.550	-5.199	0.68	10^3 cyc	0.53	0.82	0.61	0.55	0.26	0.3	0.3	0.57	0.41	0.52
							10^8 cyc	0.64	0.35	0.35	0.87	0.72	0.61	1.11	0.55	0.75	0.57
#5	SSC:1(F)	Baseplate Flame Cut	11.134	12.580	-4.805	0.60	10^3 cyc	0.56	0.87	0.64	0.59	0.27	0.32	0.31	0.6	0.44	0.55
							10^8 cyc	0.81	0.45	0.45	1.11	0.91	0.77	1.4	0.7	0.95	0.73
#6	SSC:2	Rolled I-Beam Bending	12.719	14.540	-6.048	0.64	10^3 cyc	0.74	1.14	0.84	0.77	0.36	0.42	0.41	0.79	0.57	0.72
							10^8 cyc	0.65	0.36	0.36	0.89	0.73	0.62	1.12	0.56	0.76	0.58
#7	SSC:3	Longitudinal Seam	11.750	13.540	-5.946	0.63	10^3 cyc	1	1.55	1.14	1.04	0.49	0.57	0.56	1.07	0.78	0.97
							10^8 cyc	0.91	0.51	0.5	1.25	1.02	0.87	1.58	0.79	1.07	0.82
#8	SSC:3(G)	Ground Long. Seam	12.122	14.040	-6.370	0.74	10^3 cyc	1.12	1.73	1.28	1.17	0.55	0.64	0.63	1.2	0.87	1.09
							10^8 cyc	0.89	0.5	0.49	1.23	1.01	0.85	1.55	0.77	1.06	0.81
#9	SSC:4	Long. Fillet Weld Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	1	1.55	1.14	1.04	0.49	0.57	0.56	1.07	0.78	0.97
							10^8 cyc	1	0.56	0.55	1.37	1.13	0.95	1.74	0.87	1.18	0.9
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	7.703	8.690	-3.278	0.48	10^3 cyc	0.91	1.41	1.04	0.95	0.44	0.52	0.51	0.98	0.71	0.89
							10^8 cyc	4	2.23	2.21	5.49	4.51	3.82	6.96	3.46	4.73	3.62
#11	SSC:6	Dbl I-Bm Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	1	1.55	1.14	1.04	0.49	0.57	0.56	1.07	0.78	0.97
							10^8 cyc	1	0.56	0.55	1.37	1.13	0.95	1.74	0.87	1.18	0.9
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	9.035	10.170	-3.771	0.53	10^3 cyc	0.65	1	0.74	0.67	0.31	0.37	0.36	0.69	0.5	0.63
							10^8 cyc	1.79	1	0.99	2.46	2.02	1.71	3.12	1.55	2.12	1.62
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	9.184	10.440	-4.172	0.51	10^3 cyc	0.87	1.35	1	0.91	0.43	0.5	0.49	0.94	0.68	0.85
							10^8 cyc	1.81	1.01	1	2.48	2.04	1.72	3.14	1.56	2.14	1.63
#14	SSC:8	Bolted Double Lap	12.849	14.820	-6.549	0.81	10^3 cyc	0.96	1.48	1.1	1	0.47	0.55	0.54	1.03	0.75	0.93
							10^8 cyc	0.73	0.41	0.4	1	0.82	0.69	1.27	0.63	0.86	0.66
#15	SSC:9	Riveted Single Lap	14.887	17.790	-9.643	0.90	10^3 cyc	2.05	3.17	2.35	2.14	1	1.17	1.15	2.2	1.6	2
							10^8 cyc	0.89	0.49	0.49	1.22	1	0.85	1.54	0.77	1.05	0.8
#16	SSC:10M	Butt Weld Axial:Mild Steel	12.585	14.870	-7.589	0.88	10^3 cyc	1.76	2.72	2.01	1.83	0.86	1	0.98	1.88	1.37	1.71
							10^8 cyc	1.05	0.58	0.58	1.44	1.18	1	1.82	0.91	1.24	0.95
#17	SSC:10H	Butt Weld Axial:HSLA Steel	20.148	24.000	-12.795	0.96	10^3 cyc	1.79	2.76	2.04	1.86	0.87	1.02	1	1.91	1.39	1.74
							10^8 cyc	0.58	0.32	0.32	0.79	0.65	0.55	1	0.5	0.68	0.52
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	10.588	12.130	-5.124	0.76	10^3 cyc	0.93	1.44	1.07	0.97	0.45	0.53	0.52	1	0.73	0.91
							10^8 cyc	1.16	0.64	0.64	1.59	1.3	1.1	2.01	1	1.37	1.04
#19	SSC:10(G)	Butt Weld Axial:Ground	12.904	15.050	-7.130	0.94	10^3 cyc	1.29	1.99	1.47	1.34	0.63	0.73	0.72	1.38	1	1.25
							10^8 cyc	0.85	0.47	0.47	1.16	0.95	0.81	1.47	0.73	1	0.76
#20	SSC:10A	Butt Weld Bndg	10.914	12.560	-5.468	0.79	10^3 cyc	1.03	1.59	1.18	1.07	0.5	0.59	0.58	1.1	0.8	1
							10^8 cyc	1.11	0.62	0.61	1.52	1.25	1.06	1.92	0.96	1.31	1
#21	SSC:11	I-Bm Butt Weld Bndg	10.675	12.410	-5.765	0.68	10^3 cyc	1.37	2.11	1.56	1.43	0.67	0.78	0.77	1.47	1.06	1.33
							10^8 cyc	1.32	0.74	0.73	1.81	1.49	1.26	2.29	1.14	1.56	1.19
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	9.506	10.830	-4.398	0.43	10^3 cyc	0.89	1.38	1.02	0.93	0.44	0.51	0.5	0.96	0.7	0.87
							10^8 cyc	1.6	0.89	0.89	2.2	1.81	1.53	2.79	1.39	1.9	1.45
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	11.215	12.920	-5.663	0.60	10^3 cyc	1.03	1.6	1.18	1.08	0.5	0.59	0.58	1.11	0.8	1
							10^8 cyc	1.03	0.58	0.57	1.42	1.16	0.99	1.8	0.89	1.22	0.93
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	9.947	11.220	-4.229	0.45	10^3 cyc	0.61	0.94	0.69	0.63	0.3	0.35	0.34	0.65	0.47	0.59
							10^8 cyc	1.21	0.67	0.67	1.66	1.36	1.15	2.1	1.05	1.43	1.09
#25	SSC:14	Disc. Cruciform Axial	12.901	15.140	-7.439	0.91	10^3 cyc	1.49	2.31	1.71	1.56	0.73	0.85	0.83	1.6	1.16	1.45
							10^8 cyc	0.92	0.51	0.51	1.26	1.03	0.88	1.6	0.79	1.08	0.83
#26	SSC:15	Loaded Edge Attachment Plate	8.706	9.970	-4.200	0.43	10^3 cyc	1.16	1.8	1.33	1.21	0.57	0.66	0.65	1.25	0.91	1.13
							10^8 cyc	2.36	1.32	1.31	3.25	2.66	2.25	4.11	2.05	2.79	2.14
#27	SSC:16	Partial Pen. Butt Weld	9.466	10.860	-4.631	0.58	10^3 cyc	1.1	1.7	1.26	1.15	0.54	0.63	0.62	1.18	0.85	1.07
							10^8 cyc	1.73	0.96	0.96	2.37	1.95	1.65	3.01	1.5	2.04	1.56
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	11.555	13.650	-6.960	0.95	10^3 cyc	1.84	2.85	2.11	1.92	0.9	1.05	1.03	1.97	1.43	1.79
							10^8 cyc	1.26	0.7	0.7	1.73	1.42	1.2	2.19	1.09	1.49	1.14
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	8.585	9.710	-3.736	0.34	10^3 cyc	0.82	1.27	0.94	0.86	0.4	0.47	0.46	0.88	0.64	0.8
							10^8 cyc	2.35	1.31	1.3	3.22	2.64	2.24	4.08	2.03	2.77	2.12
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	1.88	2.9	2.15	1.96	0.91	1.07	1.05	2.01	1.46	1.82
							10^8 cyc	1.08	0.6	0.6	1.48	1.21	1.03	1.87	0.93	1.27	0.97
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	8.317	9.360	-3.465	0.39	10^3 cyc	0.74	1.14	0.84	0.77	0.36	0.42	0.41	0.79	0.57	0.71
							10^8 cyc	2.67	1.49	1.48	3.67	3.01	2.55	4.64	2.31	3.16	2.41
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	1.88	2.9	2.15	1.96	0.91	1.07	1.05	2.01	1.46	1.82
							10^8 cyc	1.08	0.6	0.6	1.48	1.21	1.03	1.87	0.93	1.27	0.97
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	7.748	8.960	-4.027	0.65	10^3 cyc	1.74	2.69	1.99	1.81	0.85	0.99	0.97	1.86	1.35	1.69
							10^8 cyc	3.97	2.21	2.2	5.45	4.48	3.79	6.9	3.44	4.69	3.59
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	13.741	16.520	-9.233	0.75	10^3 cyc	2.37	3.67	2.71	2.47	1.15	1.35	1.33	2.54	1.84	2.3
							10^8 cyc	1.08	0.6	0.6	1.48	1.22	1.03	1.88	0.93	1.28	0.98
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	11.081	13.330	-7.472	0.93	10^3 cyc	2.65	4.1	3.04	2.77	1.29	1.51	1.49	2.84	2.06	2.58
							10^8 cyc	1.62	0.9	0.9	2.23	1.83	1.55	2.82	1.4	1.92	1.47

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE)									
								#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	11.706	13.970	-7.520	0.93	10^3 cyc	2.23	3.45	2.55	2.33	1.09	1.27	1.25	2.39	1.74	2.17
							10^8 cyc	1.35	0.75	0.75	1.85	1.52	1.29	2.35	1.17	1.6	1.22
#37	SSC:20	Plate Penetration: Axial	8.860	10.250	-4.619	0.66	10^3 cyc	1.47	2.28	1.69	1.54	0.72	0.84	0.82	1.58	1.15	1.43
							10^8 cyc	2.33	1.3	1.29	3.2	2.63	2.22	4.06	2.02	2.76	2.11
#38	SSC:20(S)	Plate Penetration: Shear	10.835	12.870	-6.759	0.93	10^3 cyc	2.14	3.31	2.45	2.24	1.04	1.22	1.2	2.3	1.67	2.08
							10^8 cyc	1.54	0.86	0.85	2.12	1.74	1.47	2.68	1.33	1.82	1.39
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	21.192	25.480	-14.245	0.62	10^3 cyc	2.16	3.33	2.47	2.25	1.05	1.23	1.21	2.31	1.68	2.09
							10^8 cyc	0.63	0.35	0.35	0.87	0.71	0.6	1.1	0.55	0.75	0.57
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	19.586	24.250	-15.494	0.62	10^3 cyc	3.59	5.55	4.11	3.74	1.75	2.04	2.01	3.85	2.79	3.49
							10^8 cyc	0.99	0.55	0.55	1.36	1.11	0.94	1.72	0.85	1.17	0.89
#41	SSC:21(S)	Plate Penetration: Shear	13.105	15.320	-7.358	0.83	10^3 cyc	1.35	2.08	1.54	1.41	0.66	0.77	0.75	1.44	1.05	1.31
							10^8 cyc	0.84	0.47	0.47	1.16	0.95	0.8	1.47	0.73	1	0.76
#42	SSC:22	Tee with Stud Attachment: Bndg	8.453	9.400	-3.147	0.32	10^3 cyc	0.45	0.7	0.52	0.47	0.22	0.26	0.25	0.49	0.35	0.44
							10^8 cyc	2.31	1.29	1.28	3.17	2.6	2.2	4.01	2	2.73	2.08
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.39	0.61	0.45	0.41	0.19	0.22	0.22	0.42	0.31	0.38
							10^8 cyc	1.91	1.07	1.06	2.63	2.16	1.83	3.33	1.66	2.26	1.73
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.39	0.61	0.45	0.41	0.19	0.22	0.22	0.42	0.31	0.38
							10^8 cyc	1.91	1.07	1.06	2.63	2.16	1.83	3.33	1.66	2.26	1.73
#45	SSC:25	Continuous Cruciform	12.096	14.230	-7.090	0.78	10^3 cyc	1.64	2.53	1.87	1.71	0.8	0.93	0.92	1.76	1.27	1.59
							10^8 cyc	1.09	0.61	0.6	1.49	1.23	1.04	1.89	0.94	1.29	0.98
#46	SSC:25A	Plate with Transv. Side Attachment	15.086	17.650	-8.518	0.91	10^3 cyc	1.28	1.98	1.46	1.33	0.62	0.73	0.72	1.37	0.99	1.24
							10^8 cyc	0.65	0.36	0.36	0.89	0.73	0.62	1.12	0.56	0.76	0.58
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	11.793	13.890	-6.966	0.63	10^3 cyc	1.71	2.64	1.95	1.78	0.83	0.97	0.96	1.83	1.33	1.66
							10^8 cyc	1.17	0.65	0.65	1.6	1.32	1.11	2.03	1.01	1.38	1.06
#48	SSC:26	Welded Cover Plate	7.902	8.910	-3.348	0.61	10^3 cyc	0.86	1.32	0.98	0.89	0.42	0.49	0.48	0.92	0.67	0.83
							10^8 cyc	3.49	1.95	1.93	4.8	3.94	3.33	6.07	3.02	4.13	3.16
#49	SSC:27	Double Lapped Plate with Plug Welds	7.293	8.240	-3.146	0.58	10^3 cyc	1.06	1.64	1.21	1.11	0.52	0.6	0.59	1.14	0.82	1.03
							10^8 cyc	5.39	3	2.98	7.4	6.07	5.14	9.37	4.66	6.37	4.87
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	9.391	10.980	-5.277	0.54	10^3 cyc	1.75	2.71	2.01	1.83	0.85	1	0.98	1.88	1.36	1.7
							10^8 cyc	2.03	1.13	1.13	2.79	2.29	1.94	3.54	1.76	2.4	1.84
#51	SSC:28	Baseplate with Circular Hole	13.458	15.790	-7.746	0.81	10^3 cyc	1.45	2.24	1.66	1.51	0.7	0.82	0.81	1.55	1.13	1.41
							10^8 cyc	0.84	0.47	0.46	1.15	0.94	0.8	1.46	0.73	0.99	0.76
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.299	9.250	-3.159	0.31	10^3 cyc	0.52	0.8	0.59	0.54	0.25	0.29	0.29	0.55	0.4	0.5
							10^8 cyc	2.59	1.44	1.43	3.55	2.91	2.47	4.5	2.24	3.06	2.34
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.366	10.380	-3.368	0.10	10^3 cyc	0.32	0.5	0.37	0.34	0.16	0.18	0.18	0.34	0.25	0.31
							10^8 cyc	1.29	0.72	0.71	1.77	1.45	1.23	2.24	1.11	1.52	1.16
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	8.121	9.430	-4.348	0.62	10^3 cyc	1.78	2.76	2.04	1.86	0.87	1.02	1	1.91	1.39	1.73
							10^8 cyc	3.3	1.84	1.82	4.53	3.72	3.15	5.73	2.85	3.9	2.98
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	8.211	9.250	-3.453	0.44	10^3 cyc	0.78	1.2	0.89	0.81	0.38	0.44	0.44	0.83	0.61	0.76
							10^8 cyc	2.86	1.59	1.58	3.93	3.22	2.73	4.97	2.48	3.38	2.59
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	8.706	9.970	-4.200	0.43	10^3 cyc	1.16	1.8	1.33	1.21	0.57	0.66	0.65	1.25	0.91	1.13
							10^8 cyc	2.36	1.32	1.31	3.25	2.66	2.25	4.11	2.05	2.79	2.14
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	7.406	8.470	-3.533	0.62	10^3 cyc	1.43	2.22	1.64	1.49	0.7	0.82	0.8	1.54	1.11	1.39
							10^8 cyc	4.88	2.72	2.7	6.7	5.5	4.66	8.49	4.22	5.77	4.41
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	7.758	8.860	-3.660	0.50	10^3 cyc	1.28	1.98	1.47	1.34	0.62	0.73	0.72	1.37	1	1.24
							10^8 cyc	3.9	2.17	2.16	5.35	4.39	3.72	6.77	3.37	4.61	3.52
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	14.849	17.970	-10.368	0.81	10^3 cyc	2.6	4.01	2.97	2.71	1.26	1.48	1.45	2.78	2.02	2.52
							10^8 cyc	1.03	0.58	0.57	1.42	1.16	0.98	1.79	0.89	1.22	0.93
#60	SSC:35	Butt Weld with Backing Bar	9.044	10.190	-3.808	0.28	10^3 cyc	0.67	1.03	0.77	0.7	0.33	0.38	0.37	0.72	0.52	0.65
							10^8 cyc	1.8	1	1	2.47	2.03	1.72	3.13	1.56	2.13	1.63
#61	SSC:36	Skip Welded Plates with Rathole	11.793	13.890	-6.966	0.63	10^3 cyc	1.71	2.64	1.95	1.78	0.83	0.97	0.96	1.83	1.33	1.66
							10^8 cyc	1.17	0.65	0.65	1.6	1.32	1.11	2.03	1.01	1.38	1.06
#62	SSC:36A	Skip Welded Plates	10.406	11.960	-5.163	0.46	10^3 cyc	1.04	1.61	1.19	1.09	0.51	0.59	0.58	1.12	0.81	1.01
							10^8 cyc	1.27	0.71	0.7	1.74	1.43	1.21	2.2	1.1	1.5	1.15
#63	SSC:38	Stiffener Plate Penetration: Bndg	8.408	9.450	-3.462	0.36	10^3 cyc	0.69	1.07	0.79	0.72	0.34	0.39	0.39	0.74	0.54	0.67
							10^8 cyc	2.51	1.4	1.39	3.45	2.83	2.4	4.37	2.17	2.97	2.27
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	12.552	15.630	-10.225	0.88	10^3 cyc	4.17	6.45	4.78	4.35	2.03	2.38	2.34	4.47	3.25	4.06
							10^8 cyc	1.69	0.94	0.93	2.31	1.9	1.61	2.93	1.46	1.99	1.52
#65	SSC:40	Stiffener Intersection: Bending	7.406	8.470	-3.533	0.62	10^3 cyc	1.43	2.22	1.64	1.49	0.7	0.82	0.8	1.54	1.11	1.39
							10^8 cyc	4.88	2.72	2.7	6.7	5.5	4.66	8.49	4.22	5.77	4.41
#66	SSC:42	Bending of Long Attachment	13.105	15.320	-7.358	0.83	10^3 cyc	1.35	2.08	1.54	1.41	0.66	0.77	0.75	1.44	1.05	1.31
							10^8 cyc	0.84	0.47	0.47	1.16	0.95	0.8	1.47	0.73	1	0.76
#67	SSC:46	Long. Welds on Support Gussets: Axial	8.121	9.430	-4.348	0.62	10^3 cyc	1.78	2.76	2.04	1.86	0.87	1.02	1	1.91	1.39	1.73
							10^8 cyc	3.3	1.84	1.82	4.53	3.72	3.15	5.73	2.85	3.9	2.98
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.641	10.790	-3.818	0.07	10^3 cyc	0.47	0.73	0.54	0.49	0.23	0.27	0.26	0.51	0.37	0.46
							10^8 cyc	1.26	0.7	0.7	1.73	1.42	1.2	2.19	1.09	1.49	1.14
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	9.643	10.860	-4.042	0.19	10^3 cyc	0.6	0.92	0.68	0.62	0.29	0.34	0.33	0.64	0.46	0.58
							10^8 cyc	1.35	0.75	0.75	1.85	1.52	1.29	2.35	1.17	1.6	1.22
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.24	0.37	0.28	0.25	0.12	0.14	0.14	0.26	0.19	0.24
							10^8 cyc	1.47	0.82	0.81	2.02	1.66	1.4	2.56	1.27	1.74	1.33

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #21	#22	#23	#24	#25	#26	#27	#28	#29	#30
#1	SSC:1(all steels)	Baseplate	12.325	14.050	-5.729	0.75	10^3 cyc	0.5	0.77	0.87	1.14	0.46	0.59	0.63	0.37	0.84	0.37
							10^8 cyc	0.51	0.42	0.65	0.56	0.73	0.29	0.39	0.53	0.29	0.62
#2	SSC:1M	Baseplate Mild Steel	20.259	23.940	-12.229	0.71	10^3 cyc	1.09	1.67	1.44	2.46	1	1.28	1.36	0.81	1.81	0.79
							10^8 cyc	0.38	0.31	0.48	0.41	0.54	0.21	0.29	0.4	0.21	0.46
#3	SSC:1H	Baseplate HSLA Steel	25.569	30.220	-15.449	0.91	10^3 cyc	1.07	1.63	1.41	2.41	0.98	1.25	1.33	0.79	1.77	0.78
							10^8 cyc	0.31	0.25	0.39	0.33	0.44	0.17	0.23	0.32	0.17	0.37
#4	SSC:1Q	Baseplate Q & T Steel	11.985	13.550	-5.199	0.68	10^3 cyc	0.39	0.59	0.51	0.87	0.36	0.46	0.48	0.29	0.64	0.28
							10^8 cyc	0.48	0.4	0.62	0.53	0.69	0.27	0.37	0.5	0.27	0.59
#5	SSC:1(F)	Baseplate Flame Cut	11.134	12.580	-4.805	0.60	10^3 cyc	0.41	0.63	0.54	0.93	0.38	0.48	0.51	0.3	0.68	0.3
							10^8 cyc	0.61	0.5	0.78	0.67	0.88	0.34	0.47	0.64	0.34	0.75
#6	SSC:2	Rolled I-Beam Bending	12.719	14.540	-6.048	0.64	10^3 cyc	0.54	0.82	0.71	1.21	0.49	0.63	0.67	0.4	0.9	0.39
							10^8 cyc	0.49	0.4	0.63	0.54	0.7	0.27	0.37	0.51	0.28	0.6
#7	SSC:3	Longitudinal Seam	11.750	13.540	-5.946	0.63	10^3 cyc	0.73	1.12	0.97	1.65	0.67	0.86	0.91	0.54	1.22	0.53
							10^8 cyc	0.69	0.57	0.88	0.75	0.99	0.38	0.53	0.72	0.39	0.84
#8	SSC:3(G)	Ground Long. Seam	12.122	14.040	-6.370	0.74	10^3 cyc	0.82	1.25	1.09	1.85	0.75	0.96	1.02	0.61	1.36	0.6
							10^8 cyc	0.68	0.56	0.87	0.74	0.97	0.38	0.52	0.71	0.38	0.83
#9	SSC:4	Long. Fillet Weld Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	0.73	1.12	0.97	1.65	0.67	0.86	0.91	0.54	1.22	0.53
							10^8 cyc	0.76	0.62	0.97	0.83	1.09	0.42	0.58	0.79	0.43	0.93
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	7.703	8.690	-3.278	0.48	10^3 cyc	0.67	1.02	0.88	1.5	0.61	0.78	0.83	0.49	1.11	0.49
							10^8 cyc	3.03	2.49	3.87	3.31	4.36	1.69	2.31	3.17	1.7	3.71
#11	SSC:6	Dbl I-Bm Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	0.73	1.12	0.97	1.65	0.67	0.86	0.91	0.54	1.22	0.53
							10^8 cyc	0.76	0.62	0.97	0.83	1.09	0.42	0.58	0.79	0.43	0.93
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	9.035	10.170	-3.771	0.53	10^3 cyc	0.47	0.72	0.63	1.07	0.43	0.56	0.59	0.35	0.79	0.34
							10^8 cyc	1.36	1.12	1.74	1.48	1.95	0.76	1.04	1.42	0.76	1.66
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	9.184	10.440	-4.172	0.51	10^3 cyc	0.64	0.98	0.85	1.44	0.59	0.75	0.8	0.47	1.06	0.47
							10^8 cyc	1.37	1.13	1.75	1.5	1.97	0.76	1.05	1.43	0.77	1.68
#14	SSC:8	Bolted Double Lap	12.849	14.820	-6.549	0.81	10^3 cyc	0.7	1.07	0.93	1.58	0.64	0.82	0.87	0.52	1.17	0.51
							10^8 cyc	0.55	0.45	0.7	0.6	0.79	0.31	0.42	0.58	0.31	0.68
#15	SSC:9	Riveted Single Lap	14.887	17.790	-9.843	0.90	10^3 cyc	1.5	2.3	1.99	3.39	1.38	1.76	1.87	1.11	2.5	1.1
							10^8 cyc	0.67	0.55	0.86	0.73	0.97	0.38	0.51	0.7	0.38	0.82
#16	SSC:10M	Butt Weld Axial:Mild Steel	12.585	14.870	-7.589	0.88	10^3 cyc	1.28	1.97	1.7	2.9	1.18	1.51	1.6	0.95	2.14	0.94
							10^8 cyc	0.79	0.65	1.02	0.87	1.14	0.44	0.61	0.83	0.45	0.97
#17	SSC:10H	Butt Weld Axial:HSLA Steel	20.148	24.000	-12.795	0.96	10^3 cyc	1.31	2	1.73	2.95	1.2	1.53	1.63	0.97	2.17	0.95
							10^8 cyc	0.44	0.36	0.56	0.48	0.63	0.24	0.33	0.46	0.25	0.53
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	10.588	12.130	-5.124	0.76	10^3 cyc	0.68	1.04	0.9	1.54	0.63	0.8	0.85	0.51	1.13	0.5
							10^8 cyc	0.88	0.72	1.12	0.96	1.26	0.49	0.67	0.92	0.49	1.07
#19	SSC:10(G)	Butt Weld Axial:Ground	12.904	15.050	-7.130	0.94	10^3 cyc	0.94	1.44	1.24	2.12	0.86	1.1	1.17	0.7	1.56	0.69
							10^8 cyc	0.64	0.53	0.82	0.7	0.92	0.36	0.49	0.67	0.36	0.78
#20	SSC:10A	Butt Weld Bndg	10.914	12.560	-5.468	0.79	10^3 cyc	0.75	1.15	1	1.7	0.69	0.88	0.94	0.56	1.25	0.55
							10^8 cyc	0.84	0.69	1.07	0.92	1.21	0.47	0.64	0.88	0.47	1.03
#21	SSC:11	I-Bm Butt Weld Bndg	10.675	12.410	-5.765	0.68	10^3 cyc	1	1.53	1.32	2.25	0.92	1.17	1.24	0.74	1.66	0.73
							10^8 cyc	1	0.82	1.28	1.09	1.44	0.56	0.76	1.05	0.56	1.22
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	9.506	10.830	-4.398	0.43	10^3 cyc	0.65	1	0.87	1.47	0.6	0.77	0.81	0.49	1.09	0.48
							10^8 cyc	1.22	1	1.55	1.33	1.75	0.68	0.93	1.27	0.68	1.49
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	11.215	12.920	-5.663	0.60	10^3 cyc	0.76	1.16	1	1.7	0.69	0.89	0.94	0.56	1.26	0.55
							10^8 cyc	0.78	0.64	1	0.85	1.13	0.44	0.6	0.82	0.44	0.96
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	9.947	11.220	-4.229	0.45	10^3 cyc	0.44	0.68	0.59	1	0.41	0.52	0.55	0.33	0.74	0.32
							10^8 cyc	0.92	0.75	1.17	1	1.32	0.51	0.7	0.96	0.51	1.12
#25	SSC:14	Disc. Cruciform Axial	12.901	15.140	-7.439	0.91	10^3 cyc	1.09	1.67	1.44	2.46	1	1.28	1.36	0.81	1.81	0.8
							10^8 cyc	0.7	0.57	0.89	0.76	1	0.39	0.53	0.73	0.39	0.85
#26	SSC:15	Loaded Edge Attachment Plate	8.706	9.970	-4.200	0.43	10^3 cyc	0.85	1.3	1.13	1.92	0.78	1	1.06	0.63	1.42	0.62
							10^8 cyc	1.79	1.47	2.29	1.96	2.57	1	1.37	1.87	1.01	2.19
#27	SSC:16	Partial Pen. Butt Weld	9.466	10.860	-4.631	0.58	10^3 cyc	0.8	1.23	1.06	1.81	0.74	0.94	1	0.6	1.34	0.59
							10^8 cyc	1.31	1.08	1.67	1.43	1.88	0.73	1	1.37	0.74	1.6
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	11.555	13.650	-6.960	0.95	10^3 cyc	1.35	2.06	1.78	3.04	1.24	1.58	1.68	1	2.24	0.98
							10^8 cyc	0.96	0.79	1.22	1.04	1.37	0.53	0.73	1	0.54	1.17
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	8.585	9.710	-3.736	0.34	10^3 cyc	0.6	0.92	0.8	1.36	0.55	0.71	0.75	0.45	1	0.44
							10^8 cyc	1.78	1.46	2.27	1.94	2.56	0.99	1.36	1.86	1	2.18
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	1.37	2.1	1.82	3.09	1.26	1.61	1.71	1.02	2.28	1
							10^8 cyc	0.82	0.67	1.04	0.89	1.17	0.46	0.62	0.85	0.46	1
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	8.317	9.360	-3.465	0.39	10^3 cyc	0.54	0.82	0.71	1.21	0.49	0.63	0.67	0.4	0.89	0.39
							10^8 cyc	2.02	1.66	2.59	2.21	2.91	1.13	1.54	2.12	1.14	2.48
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	1.37	2.1	1.82	3.09	1.26	1.61	1.71	1.02	2.28	1
							10^8 cyc	0.82	0.67	1.04	0.89	1.17	0.46	0.62	0.85	0.46	1
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	7.748	8.960	-4.027	0.65	10^3 cyc	1.27	1.95	1.68	2.87	1.17	1.49	1.58	0.94	2.11	0.93
							10^8 cyc	3.01	2.48	3.85	3.29	4.33	1.68	2.3	3.15	1.69	3.68
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	13.741	16.520	-9.233	0.75	10^3 cyc	1.73	2.65	2.3	3.91	1.59	2.04	2.16	1.29	2.88	1.26
							10^8 cyc	0.82	0.67	1.05	0.89	1.18	0.46	0.62	0.86	0.46	1
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	11.081	13.330	-7.472	0.93	10^3 cyc	1.94	2.97	2.57	4.37	1.78	2.28	2.41	1.44	3.23	1.41
							10^8 cyc	1.23	1.01	1.57	1.34	1.77	0.69	0.94	1.29	0.69	1.5

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
								RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE)									
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	11.706	13.970	-7.520	0.93	10^3 cyc	1.63	2.5	2.16	3.68	1.5	1.92	2.03	1.21	2.71	1.19
							10^8 cyc	1.02	0.84	1.31	1.12	1.47	0.57	0.78	1.07	0.58	1.25
#37	SSC:20	Plate Penetration: Axial	8.860	10.250	-4.619	0.66	10^3 cyc	1.08	1.65	1.43	2.43	0.99	1.27	1.34	0.8	1.79	0.79
							10^8 cyc	1.77	1.45	2.26	1.93	2.54	0.99	1.35	1.85	0.99	2.16
#38	SSC:20(S)	Plate Penetration: Shear	10.835	12.870	-6.759	0.93	10^3 cyc	1.57	2.4	2.07	3.53	1.44	1.84	1.95	1.16	2.61	1.14
							10^8 cyc	1.17	0.96	1.49	1.28	1.68	0.65	0.89	1.22	0.66	1.43
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	21.192	25.480	-14.245	0.62	10^3 cyc	1.58	2.41	2.09	3.55	1.45	1.85	1.96	1.17	2.62	1.15
							10^8 cyc	0.46	0.39	0.61	0.52	0.69	0.27	0.37	0.5	0.27	0.59
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	19.586	24.250	-15.494	0.62	10^3 cyc	2.62	4.01	3.47	5.92	2.41	3.08	3.26	1.95	4.36	1.91
							10^8 cyc	0.75	0.62	0.96	0.82	1.08	0.42	0.57	0.78	0.42	0.92
#41	SSC:21(S)	Plate Penetration: Shear	13.105	15.320	-7.358	0.83	10^3 cyc	0.99	1.51	1.3	2.22	0.9	1.16	1.23	0.73	1.64	0.72
							10^8 cyc	0.64	0.53	0.82	0.7	0.92	0.36	0.49	0.67	0.36	0.78
#42	SSC:22	Tee with Stud Attachment: Bndg	8.453	9.400	-3.147	0.32	10^3 cyc	0.33	0.51	0.44	0.75	0.3	0.39	0.41	0.25	0.55	0.24
							10^8 cyc	1.75	1.44	2.23	1.91	2.51	0.98	1.33	1.83	0.98	2.14
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.29	0.44	0.38	0.65	0.26	0.34	0.36	0.21	0.48	0.21
							10^8 cyc	1.45	1.19	1.85	1.58	2.09	0.81	1.11	1.52	0.82	1.78
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.29	0.44	0.38	0.65	0.26	0.34	0.36	0.21	0.48	0.21
							10^8 cyc	1.45	1.19	1.85	1.58	2.09	0.81	1.11	1.52	0.82	1.78
#45	SSC:25	Continuous Cruciform	12.096	14.230	-7.090	0.78	10^3 cyc	1.2	1.83	1.59	2.7	1.1	1.41	1.49	0.89	1.99	0.87
							10^8 cyc	0.82	0.68	1.05	0.9	1.19	0.46	0.63	0.86	0.46	1.01
#46	SSC:25A	Plate with Transv. Side Attachment	15.086	17.650	-8.518	0.91	10^3 cyc	0.93	1.43	1.24	2.11	0.86	1.1	1.16	0.69	1.55	0.68
							10^8 cyc	0.49	0.4	0.63	0.54	0.7	0.27	0.37	0.51	0.28	0.6
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	11.793	13.890	-6.966	0.63	10^3 cyc	1.25	1.91	1.65	2.82	1.14	1.47	1.55	0.93	2.08	0.91
							10^8 cyc	0.89	0.73	1.13	0.97	1.27	0.49	0.68	0.93	0.5	1.08
#48	SSC:26	Welded Cover Plate	7.902	8.910	-3.348	0.61	10^3 cyc	0.63	0.96	0.83	1.41	0.57	0.74	0.78	0.46	1.04	0.46
							10^8 cyc	2.65	2.18	3.38	2.89	3.81	1.48	2.02	2.77	1.49	3.24
#49	SSC:27	Double Lapped Plate with Plug Welds	7.293	8.240	-3.146	0.58	10^3 cyc	0.77	1.19	1.03	1.75	0.71	0.91	0.96	0.58	1.29	0.57
							10^8 cyc	4.09	3.36	5.22	4.46	5.87	2.28	3.12	4.27	2.3	5
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	9.391	10.980	-5.277	0.54	10^3 cyc	1.28	1.96	1.7	2.89	1.18	1.51	1.59	0.95	2.13	0.93
							10^8 cyc	1.54	1.27	1.97	1.68	2.22	0.86	1.18	1.61	0.87	1.89
#51	SSC:28	Baseplate with Circular Hole	13.458	15.790	-7.746	0.81	10^3 cyc	1.06	1.62	1.4	2.39	0.97	1.24	1.32	0.79	1.76	0.77
							10^8 cyc	0.64	0.52	0.81	0.69	0.91	0.35	0.48	0.66	0.36	0.78
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.299	9.250	-3.159	0.31	10^3 cyc	0.38	0.58	0.5	0.85	0.35	0.44	0.47	0.28	0.63	0.28
							10^8 cyc	1.96	1.61	2.5	2.14	2.82	1.09	1.5	2.05	1.1	2.4
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.366	10.380	-3.368	0.10	10^3 cyc	0.24	0.36	0.31	0.53	0.22	0.28	0.29	0.17	0.39	0.17
							10^8 cyc	0.97	0.8	1.24	1.06	1.4	0.54	0.74	1.02	0.55	1.19
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	8.121	9.430	-4.348	0.62	10^3 cyc	1.3	2	1.73	2.94	1.2	1.53	1.62	0.97	2.17	0.95
							10^8 cyc	2.5	2.06	3.19	2.73	3.59	1.4	1.91	2.61	1.41	3.06
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	8.211	9.250	-3.453	0.44	10^3 cyc	0.57	0.87	0.75	1.28	0.52	0.67	0.71	0.42	0.95	0.42
							10^8 cyc	2.17	1.78	2.77	2.37	3.12	1.21	1.65	2.27	1.22	2.65
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	8.706	9.970	-4.200	0.43	10^3 cyc	0.85	1.3	1.13	1.92	0.78	1	1.06	0.63	1.42	0.62
							10^8 cyc	1.79	1.47	2.29	1.96	2.57	1	1.37	1.87	1.01	2.19
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	7.406	8.470	-3.533	0.62	10^3 cyc	1.05	1.6	1.39	2.36	0.96	1.23	1.3	0.78	1.74	0.76
							10^8 cyc	3.7	3.04	4.73	4.04	5.32	2.06	2.82	3.87	2.08	4.53
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	7.758	8.860	-3.660	0.50	10^3 cyc	0.94	1.43	1.24	2.11	0.86	1.1	1.17	0.7	1.56	0.68
							10^8 cyc	2.95	2.43	3.77	3.23	4.25	1.65	2.25	3.09	1.66	3.61
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	14.849	17.970	-10.368	0.81	10^3 cyc	1.9	2.9	2.51	4.28	1.74	2.23	2.36	1.41	3.16	1.38
							10^8 cyc	0.78	0.64	1	0.85	1.12	0.44	0.6	0.82	0.44	0.96
#60	SSC:35	Butt Weld with Backing Bar	9.044	10.190	-3.808	0.28	10^3 cyc	0.49	0.75	0.65	1.1	0.45	0.57	0.61	0.36	0.81	0.36
							10^8 cyc	1.36	1.12	1.74	1.49	1.96	0.76	1.04	1.43	0.77	1.67
#61	SSC:36	Skip Welded Plates with Rathole	11.793	13.890	-6.966	0.63	10^3 cyc	1.25	1.91	1.65	2.82	1.14	1.47	1.55	0.93	2.08	0.91
							10^8 cyc	0.89	0.73	1.13	0.97	1.27	0.49	0.68	0.93	0.5	1.08
#62	SSC:36A	Skip Welded Plates	10.406	11.960	-5.163	0.46	10^3 cyc	0.76	1.16	1.01	1.72	0.7	0.89	0.95	0.56	1.27	0.56
							10^8 cyc	0.96	0.79	1.23	1.05	1.38	0.54	0.73	1	0.54	1.18
#63	SSC:38	Stiffener Plate Penetration: Bndg	8.408	9.450	-3.462	0.36	10^3 cyc	0.5	0.77	0.67	1.14	0.46	0.59	0.63	0.37	0.84	0.37
							10^8 cyc	1.9	1.57	2.43	2.08	2.74	1.06	1.45	1.99	1.07	2.33
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	12.552	15.630	-10.225	0.88	10^3 cyc	3.05	4.67	4.04	6.88	2.8	3.59	3.8	2.27	5.08	2.23
							10^8 cyc	1.28	1.05	1.63	1.39	1.84	0.71	0.97	1.34	0.72	1.56
#65	SSC:40	Stiffener Intersection: Bending	7.406	8.470	-3.533	0.62	10^3 cyc	1.05	1.6	1.39	2.36	0.96	1.23	1.3	0.78	1.74	0.76
							10^8 cyc	3.7	3.04	4.73	4.04	5.32	2.06	2.82	3.87	2.08	4.53
#66	SSC:42	Bending of Long Attachment	13.105	15.320	-7.358	0.83	10^3 cyc	0.99	1.51	1.3	2.22	0.9	1.16	1.23	0.73	1.64	0.72
							10^8 cyc	0.64	0.53	0.82	0.7	0.92	0.36	0.49	0.67	0.36	0.78
#67	SSC:46	Long. Welds on Support Gussets: Axial	8.121	9.430	-4.348	0.62	10^3 cyc	1.3	2	1.73	2.94	1.2	1.53	1.62	0.97	2.17	0.95
							10^8 cyc	2.5	2.06	3.19	2.73	3.59	1.4	1.91	2.61	1.41	3.06
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.841	10.790	-3.818	0.07	10^3 cyc	0.34	0.53	0.46	0.78	0.32	0.4	0.43	0.26	0.57	0.25
							10^8 cyc	0.95	0.78	1.22	1.04	1.37	0.53	0.73	1	0.54	1.17
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	9.643	10.860	-4.042	0.19	10^3 cyc	0.44	0.67	0.58	0.99	0.4	0.51	0.54	0.32	0.73	0.32
							10^8 cyc	1.02	0.84	1.31	1.12	1.47	0.57	0.78	1.07	0.58	1.25
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.16	0.27	0.23	0.4	0.16	0.21	0.22	0.13	0.29	0.13
							10^8 cyc	1.12	0.92	1.43	1.22	1.6	0.62	0.85	1.17	0.63	1.37

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE)									
								#31	#32	#33	#34	#35	#36	#37	#38	#39	#40
#1	SSC:1(all steels)	Baseplate	12.325	14.050	-5.729	0.75	10^3 cyc	0.94	0.37	0.4	0.29	0.26	0.31	0.47	0.32	0.32	0.19
							10^8 cyc	0.25	0.62	0.17	0.62	0.42	0.5	0.29	0.44	1.06	0.68
#2	SSC:1M	Baseplate Mild Steel	20.259	23.940	-12.229	0.71	10^3 cyc	2.03	0.79	0.86	0.63	0.56	0.67	1.01	0.7	0.69	0.42
							10^8 cyc	0.19	0.46	0.13	0.46	0.31	0.37	0.21	0.32	0.79	0.51
#3	SSC:1H	Baseplate HSLA Steel	25.569	30.220	-15.449	0.91	10^3 cyc	1.98	0.78	0.84	0.62	0.55	0.65	0.99	0.68	0.68	0.41
							10^8 cyc	0.15	0.37	0.1	0.37	0.25	0.3	0.17	0.26	0.64	0.41
#4	SSC:1Q	Baseplate Q & T Steel	11.985	13.550	-5.199	0.68	10^3 cyc	0.72	0.28	0.31	0.22	0.2	0.24	0.36	0.25	0.25	0.15
							10^8 cyc	0.24	0.59	0.16	0.59	0.39	0.47	0.27	0.41	1	0.64
#5	SSC:1(F)	Baseplate Flame Cut	11.134	12.580	-4.805	0.60	10^3 cyc	0.76	0.3	0.32	0.24	0.21	0.25	0.38	0.26	0.26	0.16
							10^8 cyc	0.3	0.75	0.2	0.75	0.5	0.6	0.35	0.52	1.27	0.82
#6	SSC:2	Rolled I-Beam Bending	12.719	14.540	-6.048	0.64	10^3 cyc	1	0.39	0.42	0.31	0.28	0.33	0.5	0.34	0.34	0.21
							10^8 cyc	0.24	0.6	0.16	0.6	0.4	0.48	0.28	0.42	1.02	0.65
#7	SSC:3	Longitudinal Seam	11.750	13.540	-5.946	0.63	10^3 cyc	1.36	0.53	0.58	0.42	0.38	0.45	0.68	0.47	0.46	0.28
							10^8 cyc	0.34	0.84	0.23	0.84	0.56	0.67	0.39	0.59	1.43	0.92
#8	SSC:3(G)	Ground Long. Seam	12.122	14.040	-6.370	0.74	10^3 cyc	1.52	0.6	0.64	0.47	0.42	0.5	0.76	0.52	0.52	0.31
							10^8 cyc	0.33	0.83	0.23	0.83	0.55	0.66	0.38	0.58	1.41	0.91
#9	SSC:4	Long. Fillet Weld Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	1.36	0.53	0.57	0.42	0.38	0.45	0.68	0.47	0.46	0.28
							10^8 cyc	0.37	0.93	0.25	0.93	0.62	0.74	0.43	0.65	1.58	1.01
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	7.703	8.690	-3.278	0.48	10^3 cyc	1.24	0.49	0.52	0.38	0.34	0.41	0.62	0.43	0.42	0.25
							10^8 cyc	1.5	3.71	1.01	3.7	2.47	2.96	1.72	2.6	6.32	4.05
#11	SSC:6	Dbl I-Bm Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	1.36	0.53	0.57	0.42	0.38	0.45	0.68	0.47	0.46	0.28
							10^8 cyc	0.37	0.93	0.25	0.93	0.62	0.74	0.43	0.65	1.58	1.01
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	9.035	10.170	-3.771	0.53	10^3 cyc	0.88	0.34	0.37	0.27	0.24	0.29	0.44	0.3	0.3	0.18
							10^8 cyc	0.67	1.66	0.45	1.66	1.11	1.33	0.77	1.16	2.83	1.82
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	9.184	10.440	-4.172	0.51	10^3 cyc	1.19	0.47	0.5	0.37	0.33	0.39	0.59	0.41	0.41	0.24
							10^8 cyc	0.68	1.68	0.46	1.67	1.11	1.34	0.77	1.17	2.85	1.83
#14	SSC:8	Bolted Double Lap	12.849	14.820	-6.549	0.81	10^3 cyc	1.3	0.51	0.55	0.4	0.36	0.43	0.65	0.45	0.44	0.27
							10^8 cyc	0.27	0.68	0.18	0.67	0.45	0.54	0.31	0.47	1.15	0.74
#15	SSC:9	Riveted Single Lap	14.887	17.790	-9.643	0.90	10^3 cyc	2.79	1.1	1.18	0.87	0.77	0.92	1.39	0.96	0.95	0.57
							10^8 cyc	0.33	0.82	0.22	0.82	0.55	0.66	0.38	0.58	1.4	0.9
#16	SSC:10M	Butt Weld Axial:Mild Steel	12.585	14.870	-7.589	0.88	10^3 cyc	2.39	0.94	1.01	0.74	0.66	0.79	1.19	0.82	0.81	0.49
							10^8 cyc	0.39	0.97	0.26	0.97	0.65	0.78	0.45	0.68	1.66	1.06
#17	SSC:10H	Butt Weld Axial:HSLA Steel	20.148	24.000	-12.795	0.96	10^3 cyc	2.43	0.95	1.03	0.75	0.67	0.8	1.21	0.83	0.83	0.5
							10^8 cyc	0.22	0.53	0.14	0.53	0.35	0.43	0.25	0.37	0.91	0.58
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	10.588	12.130	-5.124	0.76	10^3 cyc	1.27	0.5	0.54	0.39	0.35	0.42	0.63	0.44	0.43	0.26
							10^8 cyc	0.43	1.07	0.29	1.07	0.71	0.86	0.5	0.75	1.82	1.17
#19	SSC:10(G)	Butt Weld Axial:Ground	12.904	15.050	-7.130	0.94	10^3 cyc	1.75	0.69	0.74	0.54	0.48	0.58	0.87	0.6	0.6	0.36
							10^8 cyc	0.32	0.78	0.21	0.78	0.52	0.63	0.36	0.55	1.34	0.86
#20	SSC:10A	Butt Weld Bndg	10.914	12.560	-5.488	0.79	10^3 cyc	1.4	0.55	0.59	0.43	0.39	0.46	0.7	0.48	0.48	0.29
							10^8 cyc	0.41	1.03	0.28	1.02	0.68	0.82	0.47	0.72	1.75	1.12
#21	SSC:11	I-Bm Butt Weld Bndg	10.675	12.410	-5.765	0.88	10^3 cyc	1.86	0.73	0.79	0.58	0.52	0.61	0.93	0.64	0.63	0.38
							10^8 cyc	0.49	1.22	0.33	1.22	0.81	0.98	0.57	0.86	2.08	1.34
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	9.506	10.830	-4.398	0.43	10^3 cyc	1.22	0.48	0.51	0.38	0.34	0.4	0.61	0.42	0.41	0.25
							10^8 cyc	0.6	1.49	0.4	1.48	0.99	1.19	0.69	1.04	2.53	1.62
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	11.215	12.920	-5.663	0.60	10^3 cyc	1.4	0.55	0.59	0.44	0.39	0.46	0.7	0.48	0.48	0.29
							10^8 cyc	0.39	0.96	0.26	0.96	0.64	0.76	0.44	0.67	1.63	1.05
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	9.947	11.220	-4.229	0.45	10^3 cyc	0.82	0.32	0.35	0.26	0.23	0.27	0.41	0.28	0.28	0.17
							10^8 cyc	0.45	1.12	0.3	1.12	0.75	0.89	0.52	0.78	1.91	1.22
#25	SSC:14	Disc. Cruciform Axial	12.901	15.140	-7.439	0.91	10^3 cyc	2.03	0.8	0.86	0.63	0.56	0.67	1.01	0.7	0.69	0.42
							10^8 cyc	0.34	0.85	0.23	0.85	0.57	0.68	0.39	0.6	1.45	0.93
#26	SSC:15	Loaded Edge Attachment Plate	8.706	9.970	-4.200	0.43	10^3 cyc	1.58	0.62	0.67	0.49	0.44	0.52	0.79	0.54	0.54	0.32
							10^8 cyc	0.89	2.19	0.6	2.19	1.46	1.75	1.01	1.53	3.73	2.39
#27	SSC:16	Partial Pen. Butt Weld	9.466	10.860	-4.631	0.58	10^3 cyc	1.49	0.59	0.63	0.46	0.41	0.49	0.75	0.51	0.51	0.31
							10^8 cyc	0.65	1.6	0.44	1.6	1.07	1.28	0.74	1.12	2.73	1.75
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	11.555	13.650	-6.960	0.95	10^3 cyc	2.51	0.98	1.06	0.78	0.69	0.83	1.25	0.86	0.85	0.51
							10^8 cyc	0.47	1.17	0.32	1.17	0.78	0.93	0.54	0.82	1.99	1.28
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	8.585	9.710	-3.736	0.34	10^3 cyc	1.12	0.44	0.47	0.35	0.31	0.37	0.56	0.38	0.38	0.23
							10^8 cyc	0.88	2.18	0.59	2.17	1.45	1.74	1.01	1.52	3.71	2.38
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	2.55	1	1.08	0.79	0.71	0.84	1.27	0.88	0.87	0.52
							10^8 cyc	0.4	1	0.27	1	0.66	0.8	0.46	0.7	1.7	1.09
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	8.317	9.360	-3.465	0.39	10^3 cyc	1	0.39	0.42	0.31	0.28	0.33	0.5	0.34	0.34	0.2
							10^8 cyc	1	2.48	0.67	2.47	1.65	1.98	1.14	1.73	4.22	2.7
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	2.55	1	1.08	0.79	0.71	0.84	1.27	0.88	0.87	0.52
							10^8 cyc	0.4	1	0.27	1	0.66	0.8	0.46	0.7	1.7	1.09
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	7.748	8.960	-4.027	0.65	10^3 cyc	2.36	0.93	1	0.73	0.66	0.78	1.18	0.81	0.81	0.48
							10^8 cyc	1.49	3.68	1	3.68	2.45	2.94	1.7	2.58	6.27	4.02
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	13.741	16.520	-9.233	0.75	10^3 cyc	3.22	1.26	1.36	1	0.89	1.06	1.61	1.11	1.1	0.66
							10^8 cyc	0.4	1	0.27	1	0.67	0.8	0.46	0.7	1.71	1.09
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	11.081	13.330	-7.472	0.93	10^3 cyc	3.61	1.41	1.53	1.12	1	1.19	1.8	1.24	1.23	0.74
							10^8 cyc	0.61	1.5	0.41	1.5	1	1.2	0.7	1.05	2.56	1.64

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #31	#32	#33	#34	#35	#36	#37	#38	#39	#40
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	11.706	13.970	-7.520	0.93	10^3 cyc	3.03	1.19	1.28	0.94	0.84	1	1.51	1.04	1.03	0.62
							10^8 cyc	0.51	1.25	0.34	1.25	0.83	1	0.58	0.88	2.13	1.37
#37	SSC:20	Plate Penetration: Axial	8.860	10.250	-4.619	0.66	10^3 cyc	2	0.79	0.85	0.62	0.56	0.66	1	0.69	0.68	0.41
							10^8 cyc	0.87	2.16	0.59	2.16	1.44	1.73	1	1.51	3.68	2.36
#38	SSC:20(S)	Plate Penetration: Shear	10.835	12.870	-6.759	0.93	10^3 cyc	2.91	1.14	1.23	0.9	0.81	0.96	1.45	1	0.99	0.6
							10^8 cyc	0.58	1.43	0.39	1.43	0.95	1.14	0.66	1	2.43	1.56
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	21.192	25.480	-14.245	0.62	10^3 cyc	2.93	1.15	1.24	0.91	0.81	0.97	1.46	1.01	1	0.6
							10^8 cyc	0.24	0.59	0.16	0.59	0.39	0.47	0.27	0.41	1	0.64
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	19.586	24.250	-15.494	0.62	10^3 cyc	4.88	1.91	2.06	1.51	1.35	1.61	2.44	1.67	1.66	1
							10^8 cyc	0.37	0.92	0.25	0.91	0.61	0.73	0.42	0.64	1.56	1
#41	SSC:21(S)	Plate Penetration: Shear	13.105	15.320	-7.358	0.83	10^3 cyc	1.83	0.72	0.78	0.57	0.51	0.6	0.91	0.63	0.63	0.38
							10^8 cyc	0.32	0.78	0.21	0.78	0.52	0.62	0.36	0.55	1.33	0.85
#42	SSC:22	Tee with Stud Attachment: Bndg	8.453	9.400	-3.147	0.32	10^3 cyc	0.62	0.24	0.26	0.19	0.17	0.2	0.31	0.21	0.21	0.13
							10^8 cyc	0.86	2.14	0.58	2.13	1.42	1.71	0.99	1.5	3.64	2.33
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.54	0.21	0.23	0.17	0.15	0.18	0.27	0.18	0.18	0.11
							10^8 cyc	0.72	1.78	0.48	1.77	1.18	1.42	0.82	1.24	3.02	1.94
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.54	0.21	0.23	0.17	0.15	0.18	0.27	0.18	0.18	0.11
							10^8 cyc	0.72	1.78	0.48	1.77	1.18	1.42	0.82	1.24	3.02	1.94
#45	SSC:25	Continuous Cruciform	12.096	14.230	-7.090	0.78	10^3 cyc	2.23	0.87	0.94	0.69	0.62	0.73	1.11	0.76	0.76	0.46
							10^8 cyc	0.41	1.01	0.27	1.01	0.67	0.81	0.47	0.71	1.72	1.1
#46	SSC:25A	Plate with Transv. Side Attachment	15.086	17.650	-8.518	0.91	10^3 cyc	1.74	0.68	0.74	0.54	0.48	0.57	0.87	0.6	0.59	0.36
							10^8 cyc	0.24	0.6	0.16	0.6	0.4	0.48	0.28	0.42	1.02	0.65
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	11.793	13.890	-6.966	0.63	10^3 cyc	2.32	0.91	0.98	0.72	0.64	0.77	1.16	0.8	0.79	0.48
							10^8 cyc	0.44	1.08	0.29	1.08	0.72	0.86	0.5	0.76	1.84	1.18
#48	SSC:26	Welded Cover Plate	7.902	8.910	-3.348	0.61	10^3 cyc	1.16	0.46	0.49	0.36	0.32	0.38	0.58	0.4	0.4	0.24
							10^8 cyc	1.31	3.24	0.88	3.23	2.15	2.59	1.5	2.27	5.52	3.54
#49	SSC:27	Double Lapped Plate with Plug Welds	7.293	8.240	-3.146	0.58	10^3 cyc	1.44	0.57	0.61	0.45	0.4	0.47	0.72	0.49	0.49	0.3
							10^8 cyc	2.02	5	1.36	4.99	3.32	3.99	2.31	3.5	8.51	5.46
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	9.391	10.980	-5.277	0.54	10^3 cyc	2.38	0.93	1.01	0.74	0.66	0.79	1.19	0.82	0.81	0.49
							10^8 cyc	0.76	1.89	0.51	1.88	1.25	1.51	0.87	1.32	3.21	2.06
#51	SSC:28	Baseplate with Circular Hole	13.458	15.790	-7.746	0.81	10^3 cyc	1.97	0.77	0.83	0.61	0.55	0.65	0.98	0.68	0.67	0.4
							10^8 cyc	0.31	0.78	0.21	0.78	0.52	0.62	0.36	0.54	1.32	0.85
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.299	9.250	-3.159	0.31	10^3 cyc	0.7	0.28	0.3	0.22	0.19	0.23	0.35	0.24	0.24	0.14
							10^8 cyc	0.97	2.4	0.65	2.39	1.59	1.91	1.11	1.68	4.08	2.62
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.366	10.380	-3.368	0.10	10^3 cyc	0.44	0.17	0.19	0.14	0.12	0.14	0.22	0.15	0.15	0.09
							10^8 cyc	0.48	1.19	0.32	1.19	0.79	0.95	0.55	0.83	2.03	1.3
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	8.121	9.430	-4.348	0.62	10^3 cyc	2.43	0.95	1.03	0.75	0.67	0.8	1.21	0.83	0.83	0.5
							10^8 cyc	1.24	3.06	0.83	3.05	2.03	2.44	1.41	2.14	5.21	3.34
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	8.211	9.250	-3.453	0.44	10^3 cyc	1.06	0.42	0.45	0.33	0.29	0.35	0.53	0.36	0.36	0.22
							10^8 cyc	1.07	2.65	0.72	2.65	1.76	2.12	1.23	1.86	4.52	2.9
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	8.706	9.970	-4.200	0.43	10^3 cyc	1.58	0.62	0.67	0.49	0.44	0.52	0.79	0.54	0.54	0.32
							10^8 cyc	0.89	2.19	0.6	2.19	1.46	1.75	1.01	1.53	3.73	2.39
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	7.406	8.470	-3.533	0.62	10^3 cyc	1.95	0.76	0.82	0.6	0.54	0.64	0.97	0.67	0.66	0.4
							10^8 cyc	1.83	4.53	1.23	4.52	3.01	3.61	2.09	3.17	7.71	4.94
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	7.758	8.860	-3.660	0.50	10^3 cyc	1.74	0.68	0.74	0.54	0.48	0.57	0.87	0.6	0.59	0.36
							10^8 cyc	1.46	3.61	0.98	3.61	2.4	2.89	1.67	2.53	6.15	3.95
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	14.849	17.970	-10.366	0.81	10^3 cyc	3.53	1.38	1.49	1.09	0.98	1.16	1.76	1.21	1.2	0.72
							10^8 cyc	0.39	0.96	0.26	0.95	0.64	0.76	0.44	0.67	1.63	1.04
#60	SSC:35	Butt Weld with Backing Bar	9.044	10.190	-3.808	0.28	10^3 cyc	0.91	0.36	0.38	0.28	0.25	0.3	0.45	0.31	0.31	0.19
							10^8 cyc	0.67	1.67	0.45	1.67	1.11	1.33	0.77	1.17	2.84	1.82
#61	SSC:36	Skip Welded Plates with Rathole	11.793	13.890	-6.966	0.63	10^3 cyc	2.32	0.91	0.98	0.72	0.64	0.77	1.16	0.8	0.79	0.48
							10^8 cyc	0.44	1.08	0.29	1.08	0.72	0.86	0.5	0.76	1.84	1.18
#62	SSC:36A	Skip Welded Plates	10.406	11.960	-5.163	0.46	10^3 cyc	1.42	0.56	0.6	0.44	0.39	0.47	0.71	0.49	0.48	0.29
							10^8 cyc	0.47	1.18	0.32	1.17	0.78	0.94	0.54	0.82	2	1.28
#63	SSC:38	Stiffener Plate Penetration: Bndg	8.408	9.450	-3.462	0.36	10^3 cyc	0.94	0.37	0.4	0.29	0.26	0.31	0.47	0.32	0.32	0.19
							10^8 cyc	0.94	2.33	0.63	2.33	1.55	1.86	1.08	1.63	3.97	2.54
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	12.552	15.630	-10.225	0.88	10^3 cyc	5.68	2.23	2.4	1.76	1.57	1.87	2.83	1.95	1.94	1.16
							10^8 cyc	0.63	1.56	0.42	1.56	1.04	1.25	0.72	1.09	2.66	1.71
#65	SSC:40	Stiffener Intersection: Bending	7.406	8.470	-3.533	0.62	10^3 cyc	1.95	0.76	0.82	0.6	0.54	0.64	0.97	0.67	0.66	0.4
							10^8 cyc	1.83	4.53	1.23	4.52	3.01	3.61	2.09	3.17	7.71	4.94
#66	SSC:42	Bending of Long Attachment	13.105	15.320	-7.358	0.83	10^3 cyc	1.83	0.72	0.78	0.57	0.51	0.6	0.91	0.63	0.63	0.38
							10^8 cyc	0.32	0.78	0.21	0.78	0.52	0.62	0.36	0.55	1.33	0.85
#67	SSC:46	Long. Welds on Support Gussets: Axial	8.121	9.430	-4.348	0.62	10^3 cyc	2.43	0.95	1.03	0.75	0.67	0.8	1.21	0.83	0.83	0.5
							10^8 cyc	1.24	3.06	0.83	3.05	2.03	2.44	1.41	2.14	5.21	3.34
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.641	10.790	-3.818	0.07	10^3 cyc	0.64	0.25	0.27	0.2	0.18	0.21	0.32	0.22	0.22	0.13
							10^8 cyc	0.47	1.17	0.32	1.17	0.78	0.93	0.54	0.82	1.99	1.27
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	9.643	10.860	-4.042	0.19	10^3 cyc	0.81	0.32	0.34	0.25	0.23	0.27	0.41	0.28	0.28	0.17
							10^8 cyc	0.51	1.25	0.34	1.25	0.83	1	0.58	0.88	2.13	1.37
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.33	0.13	0.14	0.1	0.09	0.11	0.16	0.11	0.11	0.07
							10^8 cyc	0.55	1.37	0.37	1.36	0.91	1.09	0.63	0.96	2.33	1.49

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE)									
								#41	#42	#43	#44	#45	#46	#47	#48	#49	#50
#1	SSC:1(all steels)	Baseplate	12.325	14.050	-5.729	0.75	10^3 cyc	0.51	1.52	1.75	1.75	0.42	0.54	0.4	0.81	0.65	0.39
							10^8 cyc	0.8	0.29	0.35	0.35	0.62	1.04	0.58	0.19	0.12	0.33
#2	SSC:1M	Baseplate Mild Steel	20.259	23.940	-12.229	0.71	10^3 cyc	1.11	3.28	3.78	3.78	0.91	1.17	0.87	1.74	1.41	0.85
							10^8 cyc	0.59	0.22	0.26	0.26	0.46	0.77	0.43	0.14	0.09	0.25
#3	SSC:1H	Baseplate HSLA Steel	25.569	30.220	-15.449	0.91	10^3 cyc	1.08	3.21	3.7	3.7	0.89	1.14	0.85	1.7	1.38	0.83
							10^8 cyc	0.48	0.17	0.21	0.21	0.37	0.62	0.34	0.12	0.07	0.2
#4	SSC:1Q	Baseplate Q & T Steel	11.985	13.550	-5.199	0.68	10^3 cyc	0.39	1.17	1.34	1.34	0.32	0.41	0.31	0.62	0.5	0.3
							10^8 cyc	0.75	0.28	0.33	0.33	0.58	0.98	0.54	0.18	0.12	0.31
#5	SSC:1(F)	Baseplate Flame Cut	11.134	12.580	-4.805	0.60	10^3 cyc	0.42	1.24	1.42	1.42	0.34	0.44	0.33	0.66	0.53	0.32
							10^8 cyc	0.96	0.35	0.42	0.42	0.74	1.25	0.69	0.23	0.15	0.4
#6	SSC:2	Rolled I-Beam Bending	12.719	14.540	-6.048	0.64	10^3 cyc	0.55	1.62	1.87	1.87	0.45	0.58	0.43	0.86	0.69	0.42
							10^8 cyc	0.77	0.28	0.34	0.34	0.59	1	0.55	0.19	0.12	0.32
#7	SSC:3	Longitudinal Seam	11.750	13.540	-5.946	0.63	10^3 cyc	0.74	2.2	2.53	2.53	0.61	0.78	0.59	1.17	0.94	0.57
							10^8 cyc	1.08	0.39	0.47	0.47	0.83	1.4	0.78	0.26	0.17	0.45
#8	SSC:3(G)	Ground Long. Seam	12.122	14.040	-6.370	0.74	10^3 cyc	0.83	2.47	2.84	2.84	0.68	0.88	0.66	1.31	1.06	0.64
							10^8 cyc	1.06	0.39	0.47	0.47	0.82	1.38	0.77	0.26	0.17	0.44
#9	SSC:4	Long. Fillet Weld Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	0.74	2.2	2.53	2.53	0.61	0.78	0.59	1.17	0.94	0.57
							10^8 cyc	1.18	0.43	0.52	0.52	0.92	1.55	0.86	0.29	0.19	0.49
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	7.703	8.690	-3.278	0.48	10^3 cyc	0.68	2.01	2.31	2.31	0.56	0.71	0.53	1.06	0.86	0.52
							10^8 cyc	4.74	1.73	2.09	2.09	3.68	6.19	3.43	1.15	0.74	1.97
#11	SSC:6	Dbl I-Bm Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	0.74	2.2	2.53	2.53	0.61	0.78	0.59	1.17	0.94	0.57
							10^8 cyc	1.18	0.43	0.52	0.52	0.92	1.55	0.86	0.29	0.19	0.49
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	9.035	10.170	-3.771	0.53	10^3 cyc	0.48	1.42	1.64	1.64	0.39	0.51	0.38	0.76	0.61	0.37
							10^8 cyc	2.13	0.78	0.94	0.94	1.65	2.77	1.54	0.51	0.33	0.88
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	9.184	10.440	-4.172	0.51	10^3 cyc	0.65	1.93	2.21	2.21	0.53	0.68	0.51	1.02	0.82	0.5
							10^8 cyc	2.14	0.78	0.94	0.94	1.66	2.79	1.55	0.52	0.34	0.89
#14	SSC:8	Bolted Double Lap	12.849	14.820	-6.549	0.81	10^3 cyc	0.71	2.11	2.43	2.43	0.59	0.75	0.56	1.12	0.9	0.55
							10^8 cyc	0.86	0.32	0.38	0.38	0.67	1.13	0.62	0.21	0.14	0.36
#15	SSC:9	Riveted Single Lap	14.887	17.790	-9.643	0.90	10^3 cyc	1.52	4.52	5.2	5.2	1.25	1.61	1.2	2.4	1.94	1.17
							10^8 cyc	1.05	0.38	0.46	0.46	0.82	1.37	0.76	0.25	0.16	0.44
#16	SSC:10M	Butt Weld Axial:Mild Steel	12.585	14.870	-7.589	0.88	10^3 cyc	1.3	3.87	4.45	4.45	1.07	1.37	1.03	2.05	1.66	1
							10^8 cyc	1.24	0.45	0.55	0.55	0.96	1.62	0.9	0.3	0.19	0.52
#17	SSC:10H	Butt Weld Axial:HSLA Steel	20.148	24.000	-12.795	0.96	10^3 cyc	1.33	3.93	4.53	4.53	1.09	1.4	1.05	2.09	1.69	1.02
							10^8 cyc	0.68	0.25	0.3	0.3	0.53	0.89	0.49	0.16	0.11	0.28
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	10.588	12.130	-5.124	0.76	10^3 cyc	0.69	2.06	2.37	2.37	0.57	0.73	0.55	1.09	0.88	0.53
							10^8 cyc	1.37	0.5	0.6	0.6	1.06	1.79	0.99	0.33	0.21	0.57
#19	SSC:10(G)	Butt Weld Axial:Ground	12.904	15.050	-7.130	0.94	10^3 cyc	0.95	2.83	3.26	3.26	0.78	1.01	0.75	1.5	1.21	0.73
							10^8 cyc	1	0.37	0.44	0.44	0.78	1.31	0.72	0.24	0.16	0.42
#20	SSC:10A	Butt Weld Bndg	10.914	12.560	-5.468	0.79	10^3 cyc	0.76	2.27	2.61	2.61	0.63	0.81	0.6	1.2	0.97	0.59
							10^8 cyc	1.31	0.48	0.58	0.58	1.02	1.71	0.95	0.32	0.21	0.54
#21	SSC:11	I-Bm Butt Weld Bndg	10.675	12.410	-5.765	0.68	10^3 cyc	1.01	3.01	3.47	3.47	0.83	1.07	0.8	1.6	1.29	0.78
							10^8 cyc	1.56	0.57	0.69	0.69	1.21	2.04	1.13	0.38	0.24	0.65
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	9.506	10.830	-4.398	0.43	10^3 cyc	0.66	1.97	2.27	2.27	0.55	0.7	0.52	1.04	0.84	0.51
							10^8 cyc	1.9	0.7	0.84	0.84	1.47	2.48	1.37	0.46	0.3	0.79
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	11.215	12.920	-5.663	0.60	10^3 cyc	0.77	2.28	2.62	2.62	0.63	0.81	0.6	1.21	0.97	0.59
							10^8 cyc	1.22	0.45	0.54	0.54	0.95	1.6	0.88	0.3	0.19	0.51
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	9.947	11.220	-4.229	0.45	10^3 cyc	0.45	1.34	1.54	1.54	0.37	0.47	0.36	0.71	0.57	0.35
							10^8 cyc	1.43	0.52	0.63	0.63	1.11	1.87	1.03	0.35	0.22	0.59
#25	SSC:14	Disc. Cruciform Axial	12.901	15.140	-7.439	0.91	10^3 cyc	1.11	3.29	3.78	3.78	0.91	1.17	0.87	1.74	1.41	0.85
							10^8 cyc	1.09	0.4	0.48	0.48	0.84	1.42	0.79	0.26	0.17	0.45
#26	SSC:15	Loaded Edge Attachment Plate	8.706	9.970	-4.200	0.43	10^3 cyc	0.86	2.56	2.95	2.95	0.71	0.91	0.68	1.36	1.1	0.66
							10^8 cyc	2.8	1.02	1.23	1.23	2.17	3.66	2.02	0.68	0.44	1.16
#27	SSC:16	Partial Pen. Butt Weld	9.466	10.860	-4.631	0.58	10^3 cyc	0.82	2.42	2.79	2.79	0.67	0.86	0.64	1.28	1.04	0.63
							10^8 cyc	2.05	0.75	0.9	0.9	1.59	2.67	1.48	0.49	0.32	0.85
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	11.555	13.650	-6.960	0.95	10^3 cyc	1.37	4.06	4.67	4.67	1.12	1.44	1.08	2.15	1.74	1.05
							10^8 cyc	1.5	0.55	0.66	0.66	1.16	1.95	1.08	0.36	0.23	0.62
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	8.585	9.710	-3.736	0.34	10^3 cyc	0.61	1.81	2.08	2.08	0.5	0.64	0.48	0.96	0.78	0.47
							10^8 cyc	2.78	1.02	1.23	1.23	2.16	3.63	2.01	0.67	0.44	1.15
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	1.39	4.13	4.75	4.75	1.14	1.47	1.1	2.19	1.77	1.07
							10^8 cyc	1.28	0.47	0.56	0.56	0.99	1.67	0.92	0.31	0.2	0.53
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	8.317	9.360	-3.465	0.39	10^3 cyc	0.55	1.62	1.86	1.86	0.45	0.58	0.43	0.86	0.69	0.42
							10^8 cyc	3.16	1.16	1.39	1.39	2.45	4.13	2.29	0.76	0.5	1.31
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	1.39	4.13	4.75	4.75	1.14	1.47	1.1	2.19	1.77	1.07
							10^8 cyc	1.28	0.47	0.56	0.56	0.99	1.67	0.92	0.31	0.2	0.53
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	7.748	8.960	-4.027	0.65	10^3 cyc	1.29	3.83	4.41	4.41	1.06	1.36	1.02	2.03	1.64	0.99
							10^8 cyc	4.71	1.72	2.07	2.07	3.65	6.14	3.4	1.14	0.74	1.95
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	13.741	16.520	-9.233	0.75	10^3 cyc	1.76	5.22	6.01	6.01	1.45	1.85	1.39	2.77	2.24	1.35
							10^8 cyc	1.28	0.47	0.56	0.56	0.99	1.67	0.93	0.31	0.2	0.53
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	11.081	13.330	-7.472	0.93	10^3 cyc	1.97	5.84	6.72	6.72	1.62	2.08	1.55	3.1	2.5	1.51
							10^8 cyc	1.92	0.7	0.85	0.85	1.49	2.51	1.39	0.46	0.3	0.8

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE)									
								#41	#42	#43	#44	#45	#46	#47	#48	#49	#50
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	11.706	13.970	-7.520	0.93	10^3 cyc	1.66	4.91	5.65	5.65	1.36	1.75	1.31	2.6	2.11	1.27
							10^8 cyc	1.6	0.59	0.71	0.71	1.24	2.09	1.16	0.39	0.25	0.66
#37	SSC:20	Plate Penetration: Axial	8.860	10.250	-4.619	0.66	10^3 cyc	1.09	3.25	3.73	3.73	0.9	1.15	0.86	1.72	1.39	0.84
							10^8 cyc	2.76	1.01	1.22	1.22	2.14	3.61	2	0.67	0.43	1.15
#38	SSC:20(S)	Plate Penetration: Shear	10.835	12.870	-6.759	0.93	10^3 cyc	1.59	4.72	5.43	5.43	1.31	1.68	1.25	2.5	2.02	1.22
							10^8 cyc	1.83	0.67	0.8	0.8	1.42	2.38	1.32	0.44	0.29	0.76
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	21.192	25.480	-14.245	0.62	10^3 cyc	1.6	4.75	5.46	5.46	1.32	1.69	1.26	2.52	2.03	1.23
							10^8 cyc	0.75	0.27	0.33	0.33	0.58	0.98	0.54	0.18	0.12	0.31
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	19.586	24.250	-15.494	0.62	10^3 cyc	2.66	7.9	9.09	9.09	2.19	2.81	2.1	4.19	3.39	2.05
							10^8 cyc	1.17	0.43	0.52	0.52	0.91	1.53	0.65	0.28	0.18	0.49
#41	SSC:21(S)	Plate Penetration: Shear	13.105	15.320	-7.358	0.83	10^3 cyc	1	2.97	3.42	3.42	0.82	1.05	0.79	1.57	1.27	0.77
							10^8 cyc	1	0.37	0.44	0.44	0.78	1.3	0.72	0.24	0.16	0.41
#42	SSC:22	Tee with Stud Attachment: Bndg	8.453	9.400	-3.147	0.32	10^3 cyc	0.34	1	1.15	1.15	0.28	0.36	0.27	0.53	0.43	0.26
							10^8 cyc	2.73	1	1.2	1.2	2.12	3.57	1.98	0.66	0.43	1.13
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.29	0.87	1	1	0.24	0.31	0.23	0.46	0.37	0.23
							10^8 cyc	2.27	0.83	1	1	1.76	2.96	1.64	0.55	0.36	0.94
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.29	0.87	1	1	0.24	0.31	0.23	0.46	0.37	0.23
							10^8 cyc	2.27	0.83	1	1	1.76	2.96	1.64	0.55	0.36	0.94
#45	SSC:25	Continuous Cruciform	12.096	14.230	-7.090	0.78	10^3 cyc	1.22	3.61	4.15	4.15	1	1.28	0.96	1.91	1.55	0.93
							10^8 cyc	1.29	0.47	0.57	0.57	1	1.68	0.93	0.31	0.2	0.54
#46	SSC:25A	Plate with Transv. Side Attachment	15.086	17.650	-8.518	0.91	10^3 cyc	0.95	2.82	3.24	3.24	0.78	1	0.75	1.49	1.21	0.73
							10^8 cyc	0.77	0.28	0.34	0.34	0.59	1	0.55	0.19	0.12	0.32
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	11.793	13.890	-6.966	0.63	10^3 cyc	1.27	3.76	4.33	4.33	1.04	1.34	1	1.99	1.61	0.97
							10^8 cyc	1.38	0.51	0.61	0.61	1.07	1.81	1	0.33	0.22	0.57
#48	SSC:26	Welded Cover Plate	7.902	8.910	-3.348	0.61	10^3 cyc	0.64	1.89	2.17	2.17	0.52	0.67	0.5	1	0.81	0.49
							10^8 cyc	4.14	1.51	1.82	1.82	3.21	5.4	2.99	1	0.65	1.72
#49	SSC:27	Double Lapped Plate with Plug Welds	7.293	8.240	-3.146	0.58	10^3 cyc	0.79	2.33	2.69	2.69	0.65	0.83	0.62	1.24	1	0.6
							10^8 cyc	6.39	2.34	2.82	2.82	4.95	8.33	4.62	1.54	1	2.65
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	9.391	10.980	-5.277	0.54	10^3 cyc	1.3	3.86	4.44	4.44	1.07	1.37	1.03	2.05	1.65	1
							10^8 cyc	2.41	0.88	1.06	1.06	1.87	3.15	1.74	0.58	0.38	1
#51	SSC:28	Baseplate with Circular Hole	13.458	15.790	-7.746	0.81	10^3 cyc	1.07	3.19	3.67	3.67	0.88	1.13	0.85	1.69	1.37	0.83
							10^8 cyc	0.99	0.36	0.44	0.44	0.77	1.3	0.72	0.24	0.16	0.41
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.299	9.250	-3.159	0.31	10^3 cyc	0.38	1.14	1.31	1.31	0.32	0.4	0.3	0.6	0.49	0.29
							10^8 cyc	3.07	1.12	1.35	1.35	2.38	4	2.22	0.74	0.48	1.27
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.386	10.380	-3.368	0.10	10^3 cyc	0.24	0.71	0.82	0.82	0.2	0.25	0.19	0.38	0.3	0.18
							10^8 cyc	1.52	0.56	0.67	0.67	1.18	1.99	1.1	0.37	0.24	0.63
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	8.121	9.430	-4.348	0.62	10^3 cyc	1.32	3.93	4.52	4.52	1.09	1.4	1.04	2.08	1.68	1.02
							10^8 cyc	3.91	1.43	1.72	1.72	3.03	5.1	2.83	0.94	0.61	1.62
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	8.211	9.250	-3.453	0.44	10^3 cyc	0.58	1.72	1.97	1.97	0.48	0.61	0.46	0.91	0.73	0.44
							10^8 cyc	3.39	1.24	1.49	1.49	2.63	4.42	2.45	0.82	0.53	1.41
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	8.706	9.970	-4.200	0.43	10^3 cyc	0.86	2.56	2.95	2.95	0.71	0.91	0.68	1.36	1.1	0.66
							10^8 cyc	2.8	1.02	1.23	1.23	2.17	3.66	2.02	0.68	0.44	1.16
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	7.406	8.470	-3.533	0.62	10^3 cyc	1.06	3.16	3.63	3.63	0.87	1.12	0.84	1.67	1.35	0.82
							10^8 cyc	5.78	2.12	2.55	2.55	4.49	7.55	4.18	1.4	0.91	2.4
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	7.758	8.860	-3.660	0.50	10^3 cyc	0.95	2.82	3.25	3.25	0.78	1	0.75	1.5	1.21	0.73
							10^8 cyc	4.62	1.69	2.04	2.04	3.58	6.03	3.34	1.12	0.72	1.92
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	14.849	17.970	-10.366	0.81	10^3 cyc	1.93	5.72	6.58	6.58	1.58	2.03	1.52	3.03	2.45	1.48
							10^8 cyc	1.22	0.45	0.54	0.54	0.95	1.6	0.88	0.3	0.19	0.51
#60	SSC:35	Butt Weld with Backing Bar	9.044	10.190	-3.808	0.28	10^3 cyc	0.5	1.47	1.69	1.69	0.41	0.52	0.39	0.78	0.63	0.38
							10^8 cyc	2.13	0.78	0.94	0.94	1.65	2.78	1.54	0.52	0.33	0.88
#61	SSC:36	Skip Welded Plates with Rathole	11.793	13.890	-6.966	0.63	10^3 cyc	1.27	3.76	4.33	4.33	1.04	1.34	1	1.99	1.61	0.97
							10^8 cyc	1.38	0.51	0.61	0.61	1.07	1.81	1	0.33	0.22	0.57
#62	SSC:36A	Skip Welded Plates	10.406	11.960	-5.163	0.46	10^3 cyc	0.77	2.29	2.64	2.64	0.64	0.81	0.61	1.22	0.98	0.59
							10^8 cyc	1.5	0.55	0.66	0.66	1.16	1.96	1.09	0.36	0.24	0.62
#63	SSC:38	Stiffener Plate Penetration: Bndg	8.408	9.450	-3.462	0.36	10^3 cyc	0.51	1.52	1.75	1.75	0.42	0.54	0.4	0.81	0.65	0.39
							10^8 cyc	2.98	1.09	1.31	1.31	2.31	3.89	2.15	0.72	0.47	1.24
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	12.552	15.630	-10.225	0.88	10^3 cyc	3.1	9.19	10.58	10.58	2.55	3.27	2.44	4.87	3.94	2.38
							10^8 cyc	2	0.73	0.88	0.88	1.55	2.61	1.44	0.48	0.31	0.83
#65	SSC:40	Stiffener Intersection: Bending	7.406	8.470	-3.533	0.62	10^3 cyc	1.06	3.16	3.63	3.63	0.87	1.12	0.84	1.67	1.35	0.82
							10^8 cyc	5.78	2.12	2.55	2.55	4.49	7.55	4.18	1.4	0.91	2.4
#66	SSC:42	Bending of Long Attachment	13.105	15.320	-7.358	0.83	10^3 cyc	1	2.97	3.42	3.42	0.82	1.05	0.79	1.57	1.27	0.77
							10^8 cyc	1	0.37	0.44	0.44	0.78	1.3	0.72	0.24	0.16	0.41
#67	SSC:46	Long. Welds on Support Gussets: Axial	8.121	9.430	-4.348	0.62	10^3 cyc	1.32	3.93	4.52	4.52	1.09	1.4	1.04	2.08	1.68	1.02
							10^8 cyc	3.91	1.43	1.72	1.72	3.03	5.1	2.83	0.94	0.61	1.62
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.641	10.790	-3.818	0.07	10^3 cyc	0.35	1.04	1.19	1.19	0.29	0.37	0.28	0.55	0.44	0.27
							10^8 cyc	1.49	0.55	0.66	0.66	1.16	1.95	1.08	0.36	0.23	0.62
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	9.643	10.860	-4.042	0.19	10^3 cyc	0.44	1.32	1.51	1.51	0.36	0.47	0.35	0.7	0.56	0.34
							10^8 cyc	1.6	0.59	0.71	0.71	1.24	2.09	1.16	0.39	0.25	0.66
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.18	0.53	0.61	0.61	0.15	0.19	0.14	0.28	0.23	0.14
							10^8 cyc	1.75	0.64	0.77	0.77	1.35	2.28	1.26	0.42	0.27	0.72

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #51	#52	#53	#54	#55	#56	#57	#58	#59	#60
#1	SSC:1(all steels)	Baseplate	12.325	14.050	-5.729	0.75	10^3 cyc	0.48	1.34	2.14	0.39	0.89	0.59	0.48	0.54	0.27	1.03
							10^8 cyc	0.8	0.26	0.52	0.2	0.24	0.29	0.14	0.17	0.65	0.37
#2	SSC:1M	Baseplate Mild Steel	20.259	23.940	-12.229	0.71	10^3 cyc	1.03	2.89	4.63	0.84	1.91	1.28	1.04	1.16	0.57	2.23
							10^8 cyc	0.6	0.19	0.39	0.15	0.17	0.21	0.1	0.13	0.48	0.28
#3	SSC:1H	Baseplate HSLA Steel	25.569	30.220	-15.449	0.91	10^3 cyc	1.01	2.83	4.53	0.82	1.87	1.25	1.02	1.14	0.56	2.18
							10^8 cyc	0.48	0.16	0.31	0.12	0.14	0.17	0.08	0.1	0.39	0.22
#4	SSC:1Q	Baseplate Q & T Steel	11.985	13.550	-5.199	0.68	10^3 cyc	0.37	1.03	1.65	0.3	0.68	0.46	0.37	0.41	0.2	0.79
							10^8 cyc	0.76	0.25	0.49	0.19	0.22	0.27	0.13	0.16	0.62	0.35
#5	SSC:1(F)	Baseplate Flame Cut	11.134	12.580	-4.805	0.60	10^3 cyc	0.39	1.09	1.75	0.31	0.72	0.48	0.39	0.44	0.22	0.84
							10^8 cyc	0.96	0.31	0.63	0.24	0.28	0.34	0.17	0.21	0.78	0.45
#6	SSC:2	Rolled I-Beam Bending	12.719	14.540	-6.048	0.64	10^3 cyc	0.51	1.43	2.29	0.41	0.95	0.63	0.51	0.57	0.28	1.1
							10^8 cyc	0.77	0.25	0.5	0.2	0.23	0.27	0.13	0.17	0.63	0.36
#7	SSC:3	Longitudinal Seam	11.750	13.540	-5.946	0.63	10^3 cyc	0.69	1.94	3.11	0.56	1.28	0.86	0.7	0.78	0.39	1.5
							10^8 cyc	1.08	0.35	0.71	0.28	0.32	0.38	0.19	0.23	0.88	0.5
#8	SSC:3(G)	Ground Long. Seam	12.122	14.040	-6.370	0.74	10^3 cyc	0.77	2.17	3.48	0.63	1.44	0.96	0.78	0.87	0.43	1.68
							10^8 cyc	1.07	0.35	0.7	0.27	0.31	0.38	0.18	0.23	0.87	0.5
#9	SSC:4	Long. Fillet Weld Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	0.69	1.94	3.11	0.56	1.28	0.86	0.7	0.78	0.39	1.5
							10^8 cyc	1.19	0.39	0.78	0.3	0.35	0.42	0.2	0.26	0.97	0.56
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	7.703	8.690	-3.278	0.48	10^3 cyc	0.63	1.77	2.83	0.51	1.17	0.78	0.64	0.71	0.35	1.36
							10^8 cyc	4.77	1.55	3.11	1.21	1.4	1.69	0.82	1.03	3.88	2.22
#11	SSC:6	Dbl I-Bm Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	0.69	1.94	3.11	0.56	1.28	0.86	0.7	0.78	0.39	1.5
							10^8 cyc	1.19	0.39	0.78	0.3	0.35	0.42	0.2	0.26	0.97	0.56
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	9.035	10.170	-3.771	0.53	10^3 cyc	0.45	1.25	2.01	0.36	0.83	0.56	0.45	0.5	0.25	0.97
							10^8 cyc	2.14	0.69	1.4	0.54	0.63	0.76	0.37	0.46	1.74	1
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	9.184	10.440	-4.172	0.51	10^3 cyc	0.6	1.69	2.72	0.49	1.12	0.75	0.61	0.68	0.34	1.31
							10^8 cyc	2.16	0.7	1.41	0.55	0.63	0.76	0.37	0.46	1.75	1
#14	SSC:8	Bolted Double Lap	12.849	14.820	-6.549	0.81	10^3 cyc	0.66	1.86	2.98	0.54	1.23	0.82	0.67	0.75	0.37	1.43
							10^8 cyc	0.87	0.28	0.57	0.22	0.25	0.31	0.15	0.19	0.71	0.4
#15	SSC:9	Riveted Single Lap	14.887	17.790	-9.643	0.90	10^3 cyc	1.42	3.98	6.38	1.15	2.64	1.76	1.43	1.6	0.79	3.07
							10^8 cyc	1.06	0.34	0.69	0.27	0.31	0.38	0.18	0.23	0.86	0.49
#16	SSC:10M	Butt Weld Axial:Mild Steel	12.585	14.870	-7.589	0.88	10^3 cyc	1.21	3.4	5.46	0.98	2.26	1.51	1.23	1.37	0.68	2.63
							10^8 cyc	1.25	0.41	0.82	0.32	0.37	0.44	0.21	0.27	1.02	0.58
#17	SSC:10H	Butt Weld Axial:HSLA Steel	20.148	24.000	-12.795	0.96	10^3 cyc	1.23	3.46	5.55	1	2.29	1.53	1.25	1.39	0.69	2.67
							10^8 cyc	0.69	0.22	0.45	0.17	0.2	0.24	0.12	0.15	0.56	0.32
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	10.588	12.130	-5.124	0.76	10^3 cyc	0.64	1.81	2.9	0.52	1.2	0.8	0.65	0.73	0.36	1.4
							10^8 cyc	1.38	0.45	0.9	0.35	0.4	0.49	0.24	0.3	1.12	0.64
#19	SSC:10(G)	Butt Weld Axial:Ground	12.904	15.050	-7.130	0.94	10^3 cyc	0.89	2.49	4	0.72	1.65	1.1	0.9	1	0.5	1.92
							10^8 cyc	1.01	0.33	0.66	0.26	0.3	0.36	0.17	0.22	0.82	0.47
#20	SSC:10A	Butt Weld Bndg	10.914	12.560	-5.468	0.79	10^3 cyc	0.71	1.99	3.2	0.58	1.32	0.88	0.72	0.8	0.4	1.54
							10^8 cyc	1.32	0.43	0.86	0.34	0.39	0.47	0.23	0.28	1.07	0.61
#21	SSC:11	I-Bm Butt Weld Bndg	10.675	12.410	-5.765	0.68	10^3 cyc	0.94	2.65	4.25	0.77	1.76	1.17	0.95	1.07	0.53	2.05
							10^8 cyc	1.57	0.51	1.03	0.4	0.46	0.56	0.27	0.34	1.28	0.73
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	9.506	10.830	-4.398	0.43	10^3 cyc	0.62	1.73	2.78	0.5	1.15	0.77	0.62	0.7	0.34	1.34
							10^8 cyc	1.91	0.62	1.25	0.49	0.56	0.68	0.33	0.41	1.55	0.89
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	11.215	12.920	-5.663	0.60	10^3 cyc	0.71	2	3.21	0.58	1.33	0.89	0.72	0.81	0.4	1.54
							10^8 cyc	1.23	0.4	0.8	0.31	0.36	0.44	0.21	0.27	1	0.57
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	9.947	11.220	-4.229	0.45	10^3 cyc	0.42	1.17	1.88	0.34	0.78	0.52	0.42	0.47	0.23	0.91
							10^8 cyc	1.44	0.47	0.94	0.37	0.42	0.51	0.25	0.31	1.17	0.67
#25	SSC:14	Disc. Cruciform Axial	12.901	15.140	-7.439	0.91	10^3 cyc	1.03	2.89	4.64	0.84	1.92	1.28	1.04	1.16	0.57	2.23
							10^8 cyc	1.1	0.35	0.71	0.28	0.32	0.39	0.19	0.24	0.89	0.51
#26	SSC:15	Loaded Edge Attachment Plate	8.706	9.970	-4.200	0.43	10^3 cyc	0.8	2.26	3.62	0.65	1.49	1	0.81	0.91	0.45	1.74
							10^8 cyc	2.82	0.91	1.84	0.72	0.83	1	0.48	0.61	2.29	1.31
#27	SSC:16	Partial Pen. Butt Weld	9.466	10.860	-4.631	0.58	10^3 cyc	0.76	2.13	3.42	0.62	1.41	0.94	0.77	0.86	0.42	1.64
							10^8 cyc	2.06	0.67	1.34	0.52	0.6	0.73	0.35	0.44	1.68	0.96
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	11.555	13.650	-6.960	0.95	10^3 cyc	1.27	3.57	5.73	1.03	2.37	1.58	1.29	1.44	0.71	2.76
							10^8 cyc	1.51	0.49	0.98	0.38	0.44	0.53	0.26	0.32	1.22	0.7
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	8.585	9.710	-3.736	0.34	10^3 cyc	0.57	1.59	2.56	0.46	1.06	0.71	0.57	0.64	0.32	1.23
							10^8 cyc	2.8	0.91	1.83	0.71	0.82	0.99	0.48	0.6	2.28	1.3
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	1.3	3.63	5.83	1.05	2.41	1.61	1.31	1.46	0.72	2.8
							10^8 cyc	1.29	0.42	0.84	0.33	0.38	0.46	0.22	0.28	1.05	0.6
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	8.317	9.360	-3.465	0.39	10^3 cyc	0.51	1.42	2.29	0.41	0.94	0.63	0.51	0.57	0.28	1.1
							10^8 cyc	3.19	1.03	2.08	0.81	0.93	1.13	0.55	0.69	2.59	1.48
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	1.3	3.63	5.83	1.05	2.41	1.61	1.31	1.46	0.72	2.8
							10^8 cyc	1.29	0.42	0.84	0.33	0.38	0.46	0.22	0.28	1.05	0.6
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	7.748	8.960	-4.027	0.65	10^3 cyc	1.2	3.37	5.4	0.97	2.23	1.49	1.21	1.36	0.67	2.6
							10^8 cyc	4.74	1.54	3.09	1.2	1.39	1.68	0.81	1.02	3.85	2.21
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	13.741	16.520	-9.233	0.75	10^3 cyc	1.64	4.59	7.37	1.33	3.04	2.04	1.65	1.85	0.91	3.55
							10^8 cyc	1.29	0.42	0.84	0.33	0.38	0.46	0.22	0.28	1.05	0.6
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	11.081	13.330	-7.472	0.93	10^3 cyc	1.83	5.14	8.25	1.49	3.41	2.28	1.85	2.07	1.02	3.97
							10^8 cyc	1.94	0.63	1.26	0.49	0.57	0.69	0.33	0.42	1.57	0.9

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	#51	#52	#53	#54	#55	#56	#57	#58	#59	#60
								RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE)									
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	11.706	13.970	-7.520	0.93	10^3 cyc	1.54	4.32	6.93	1.25	2.86	1.92	1.56	1.74	0.86	3.34
							10^8 cyc	1.61	0.52	1.05	0.41	0.47	0.57	0.28	0.35	1.31	0.75
#37	SSC:20	Plate Penetration: Axial	8.860	10.250	-4.619	0.66	10^3 cyc	1.02	2.85	4.58	0.83	1.89	1.27	1.03	1.15	0.57	2.2
							10^8 cyc	2.78	0.9	1.81	0.71	0.82	0.99	0.48	0.6	2.26	1.3
#38	SSC:20(S)	Plate Penetration: Shear	10.835	12.870	-8.759	0.93	10^3 cyc	1.48	4.15	6.66	1.2	2.75	1.84	1.5	1.67	0.83	3.21
							10^8 cyc	1.84	0.6	1.2	0.47	0.54	0.65	0.32	0.4	1.49	0.86
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	21.192	25.480	-14.245	0.62	10^3 cyc	1.49	4.18	6.7	1.21	2.77	1.85	1.5	1.68	0.83	3.22
							10^8 cyc	0.76	0.24	0.49	0.19	0.22	0.27	0.13	0.16	0.61	0.35
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	19.586	24.250	-15.494	0.62	10^3 cyc	2.48	6.95	11.15	2.01	4.61	3.08	2.5	2.8	1.38	5.37
							10^8 cyc	1.18	0.38	0.77	0.3	0.35	0.42	0.2	0.25	0.96	0.55
#41	SSC:21(S)	Plate Penetration: Shear	13.105	15.320	-7.358	0.83	10^3 cyc	0.93	2.61	4.19	0.76	1.73	1.16	0.94	1.05	0.52	2.02
							10^8 cyc	1.01	0.33	0.66	0.26	0.29	0.36	0.17	0.22	0.82	0.47
#42	SSC:22	Tee with Stud Attachment: Bndg	8.453	9.400	-3.147	0.32	10^3 cyc	0.31	0.88	1.41	0.25	0.58	0.39	0.32	0.35	0.17	0.68
							10^8 cyc	2.75	0.89	1.79	0.7	0.81	0.98	0.47	0.59	2.24	1.28
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.27	0.76	1.23	0.22	0.51	0.34	0.28	0.31	0.15	0.59
							10^8 cyc	2.28	0.74	1.49	0.58	0.67	0.81	0.39	0.49	1.86	1.06
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.27	0.76	1.23	0.22	0.51	0.34	0.28	0.31	0.15	0.59
							10^8 cyc	2.28	0.74	1.49	0.58	0.67	0.81	0.39	0.49	1.86	1.06
#45	SSC:25	Continuous Cruciform	12.096	14.230	-7.090	0.78	10^3 cyc	1.13	3.17	5.09	0.92	2.1	1.41	1.14	1.28	0.63	2.45
							10^8 cyc	1.3	0.42	0.85	0.33	0.38	0.46	0.22	0.28	1.05	0.6
#46	SSC:25A	Plate with Transv. Side Attachment	15.086	17.650	-8.518	0.91	10^3 cyc	0.88	2.48	3.97	0.72	1.64	1.1	0.89	1	0.49	1.91
							10^8 cyc	0.77	0.25	0.5	0.2	0.23	0.27	0.13	0.17	0.63	0.36
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	11.793	13.890	-6.966	0.63	10^3 cyc	1.18	3.31	5.31	0.96	2.19	1.47	1.19	1.33	0.66	2.55
							10^8 cyc	1.39	0.45	0.91	0.35	0.41	0.49	0.24	0.3	1.13	0.65
#48	SSC:26	Welded Cover Plate	7.902	8.910	-3.348	0.61	10^3 cyc	0.59	1.66	2.66	0.48	1.1	0.74	0.6	0.67	0.33	1.28
							10^8 cyc	4.17	1.35	2.72	1.06	1.22	1.48	0.72	0.9	3.39	1.94
#49	SSC:27	Double Lapped Plate with Plug Welds	7.293	8.240	-3.146	0.58	10^3 cyc	0.73	2.05	3.29	0.59	1.36	0.91	0.74	0.83	0.41	1.58
							10^8 cyc	6.43	2.08	4.19	1.63	1.88	2.28	1.1	1.38	5.22	2.99
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	9.391	10.980	-5.277	0.54	10^3 cyc	1.21	3.4	5.45	0.98	2.25	1.51	1.22	1.37	0.68	2.62
							10^8 cyc	2.43	0.79	1.58	0.62	0.71	0.86	0.42	0.52	1.97	1.13
#51	SSC:28	Baseplate with Circular Hole	13.458	15.790	-7.746	0.81	10^3 cyc	1	2.8	4.5	0.81	1.86	1.24	1.01	1.13	0.56	2.17
							10^8 cyc	1	0.32	0.65	0.25	0.29	0.35	0.17	0.22	0.81	0.47
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.299	9.250	-3.159	0.31	10^3 cyc	0.36	1	1.6	0.29	0.66	0.44	0.36	0.4	0.2	0.77
							10^8 cyc	3.09	1	2.01	0.78	0.9	1.09	0.53	0.66	2.51	1.44
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.366	10.380	-3.368	0.10	10^3 cyc	0.22	0.62	1	0.18	0.41	0.28	0.22	0.25	0.12	0.48
							10^8 cyc	1.53	0.5	1	0.39	0.45	0.54	0.26	0.33	1.25	0.71
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	8.121	9.430	-4.348	0.62	10^3 cyc	1.23	3.46	5.54	1	2.29	1.53	1.24	1.39	0.69	2.67
							10^8 cyc	3.94	1.28	2.57	1	1.15	1.4	0.68	0.85	3.2	1.83
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	8.211	9.250	-3.453	0.44	10^3 cyc	0.54	1.51	2.42	0.44	1	0.67	0.54	0.61	0.3	1.16
							10^8 cyc	3.41	1.11	2.23	0.87	1	1.21	0.59	0.73	2.77	1.59
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	8.706	9.970	-4.200	0.43	10^3 cyc	0.8	2.26	3.62	0.65	1.49	1	0.81	0.91	0.45	1.74
							10^8 cyc	2.82	0.91	1.84	0.72	0.83	1	0.48	0.61	2.29	1.31
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	7.406	8.470	-3.533	0.62	10^3 cyc	0.99	2.78	4.45	0.8	1.84	1.23	1	1.12	0.55	2.14
							10^8 cyc	5.82	1.89	3.8	1.48	1.71	2.06	1	1.25	4.73	2.71
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	7.758	8.860	-3.660	0.50	10^3 cyc	0.88	2.48	3.98	0.72	1.64	1.1	0.89	1	0.49	1.92
							10^8 cyc	4.65	1.51	3.03	1.18	1.36	1.65	0.8	1	3.78	2.16
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	14.849	17.970	-10.368	0.81	10^3 cyc	1.79	5.03	8.07	1.46	3.33	2.23	1.81	2.03	1	3.88
							10^8 cyc	1.23	0.4	0.8	0.31	0.36	0.44	0.21	0.26	1	0.57
#60	SSC:35	Butt Weld with Backing Bar	9.044	10.190	-3.808	0.28	10^3 cyc	0.46	1.3	2.08	0.37	0.86	0.57	0.47	0.52	0.26	1
							10^8 cyc	2.15	0.7	1.4	0.55	0.63	0.76	0.37	0.46	1.74	1
#61	SSC:36	Skip Welded Plates with Rathole	11.793	13.890	-6.966	0.63	10^3 cyc	1.18	3.31	5.31	0.96	2.19	1.47	1.19	1.33	0.66	2.55
							10^8 cyc	1.39	0.45	0.91	0.35	0.41	0.49	0.24	0.3	1.13	0.65
#62	SSC:36A	Skip Welded Plates	10.406	11.960	-5.163	0.46	10^3 cyc	0.72	2.02	3.24	0.58	1.34	0.89	0.73	0.81	0.4	1.56
							10^8 cyc	1.51	0.49	0.99	0.38	0.44	0.54	0.26	0.33	1.23	0.7
#63	SSC:38	Stiffener Plate Penetration: Bndg	8.408	9.450	-3.462	0.36	10^3 cyc	0.48	1.34	2.14	0.39	0.89	0.59	0.48	0.54	0.27	1.03
							10^8 cyc	3	0.97	1.95	0.76	0.88	1.06	0.51	0.64	2.44	1.4
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	12.552	15.630	-10.225	0.88	10^3 cyc	2.88	8.09	12.97	2.34	5.36	3.59	2.91	3.26	1.61	6.24
							10^8 cyc	2.01	0.65	1.31	0.51	0.59	0.71	0.35	0.43	1.63	0.94
#65	SSC:40	Stiffener Intersection: Bending	7.406	8.470	-3.533	0.62	10^3 cyc	0.99	2.78	4.45	0.8	1.84	1.23	1	1.12	0.55	2.14
							10^8 cyc	5.82	1.89	3.8	1.48	1.71	2.06	1	1.25	4.73	2.71
#66	SSC:42	Bending of Long Attachment	13.105	15.320	-7.358	0.83	10^3 cyc	0.93	2.61	4.19	0.76	1.73	1.16	0.94	1.05	0.52	2.02
							10^8 cyc	1.01	0.33	0.66	0.26	0.29	0.36	0.17	0.22	0.82	0.47
#67	SSC:46	Long. Welds on Support Gussets: Axial	8.121	9.430	-4.348	0.62	10^3 cyc	1.23	3.46	5.54	1	2.29	1.53	1.24	1.39	0.69	2.67
							10^8 cyc	3.94	1.28	2.57	1	1.15	1.4	0.68	0.85	3.2	1.83
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.641	10.790	-3.818	0.07	10^3 cyc	0.33	0.91	1.46	0.26	0.61	0.4	0.33	0.37	0.18	0.7
							10^8 cyc	1.5	0.49	0.98	0.38	0.44	0.53	0.26	0.32	1.22	0.7
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	9.643	10.860	-4.042	0.19	10^3 cyc	0.41	1.16	1.86	0.33	0.77	0.51	0.42	0.47	0.23	0.89
							10^8 cyc	1.61	0.52	1.05	0.41	0.47	0.57	0.28	0.35	1.31	0.75
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.17	0.47	0.75	0.14	0.31	0.21	0.17	0.19	0.09	0.36
							10^8 cyc	1.76	0.57	1.15	0.45	0.51	0.62	0.3	0.38	1.43	0.82

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #61	#62	#63	#64	#65	#66	#67	#68	#69	#70
#1	SSC:1(all steels)	Baseplate	12.325	14.050	-5.729	0.75	10^3 cyc	0.4	0.66	1	0.17	0.48	0.51	0.39	1.46	1.15	2.85
							10^8 cyc	0.58	0.53	0.27	0.4	0.14	0.8	0.2	0.54	0.5	0.46
#2	SSC:1M	Baseplate Mild Steel	20.259	23.940	-12.229	0.71	10^3 cyc	0.87	1.43	2.16	0.36	1.04	1.11	0.84	3.16	2.49	6.15
							10^8 cyc	0.43	0.39	0.2	0.3	0.1	0.59	0.15	0.4	0.37	0.34
#3	SSC:1H	Baseplate HSLA Steel	25.569	30.220	-15.449	0.91	10^3 cyc	0.85	1.4	2.11	0.35	1.02	1.08	0.82	3.1	2.44	6.02
							10^8 cyc	0.34	0.32	0.16	0.24	0.08	0.48	0.12	0.32	0.3	0.27
#4	SSC:1Q	Baseplate Q & T Steel	11.985	13.550	-5.199	0.68	10^3 cyc	0.31	0.51	0.77	0.13	0.37	0.39	0.3	1.13	0.89	2.19
							10^8 cyc	0.54	0.5	0.25	0.38	0.13	0.75	0.19	0.51	0.47	0.43
#5	SSC:1(F)	Baseplate Flame Cut	11.134	12.580	-4.805	0.60	10^3 cyc	0.33	0.54	0.81	0.13	0.39	0.42	0.31	1.19	0.94	2.32
							10^8 cyc	0.69	0.64	0.32	0.48	0.17	0.96	0.24	0.64	0.6	0.55
#6	SSC:2	Rolled I-Beam Bending	12.719	14.540	-6.048	0.64	10^3 cyc	0.43	0.71	1.07	0.18	0.51	0.55	0.41	1.56	1.23	3.04
							10^8 cyc	0.55	0.51	0.26	0.38	0.13	0.77	0.2	0.51	0.48	0.44
#7	SSC:3	Longitudinal Seam	11.750	13.540	-5.946	0.63	10^3 cyc	0.59	0.96	1.45	0.24	0.7	0.74	0.56	2.12	1.67	4.13
							10^8 cyc	0.78	0.72	0.36	0.54	0.19	1.08	0.28	0.72	0.67	0.62
#8	SSC:3(G)	Ground Long. Seam	12.122	14.040	-6.370	0.74	10^3 cyc	0.66	1.08	1.62	0.27	0.78	0.83	0.63	2.38	1.88	4.62
							10^8 cyc	0.77	0.71	0.36	0.53	0.18	1.06	0.27	0.71	0.66	0.61
#9	SSC:4	Long. Fillet Weld Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	0.59	0.96	1.45	0.24	0.7	0.74	0.56	2.12	1.67	4.13
							10^8 cyc	0.86	0.79	0.4	0.59	0.2	1.18	0.3	0.79	0.74	0.68
#10	SSC:5	Cvr Plt on I-Bm Flg Bndg	7.703	8.690	-3.278	0.48	10^3 cyc	0.53	0.88	1.32	0.22	0.64	0.68	0.51	1.93	1.53	3.76
							10^8 cyc	3.43	3.16	1.59	2.37	0.82	4.74	1.21	3.18	2.96	2.72
#11	SSC:6	Dbl I-Bm Bndg	11.295	13.000	-5.663	0.61	10^3 cyc	0.59	0.96	1.45	0.24	0.7	0.74	0.56	2.12	1.67	4.13
							10^8 cyc	0.86	0.79	0.4	0.59	0.2	1.18	0.3	0.79	0.74	0.68
#12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	9.035	10.170	-3.771	0.53	10^3 cyc	0.38	0.62	0.94	0.15	0.45	0.48	0.36	1.37	1.08	2.67
							10^8 cyc	1.54	1.42	0.71	1.06	0.37	2.13	0.54	1.43	1.33	1.22
#13	SSC:7P	I-Bm w/vrt Web St Prin Stress	9.184	10.440	-4.172	0.51	10^3 cyc	0.51	0.84	1.27	0.21	0.61	0.65	0.49	1.85	1.46	3.61
							10^8 cyc	1.55	1.43	0.72	1.07	0.37	2.14	0.55	1.44	1.34	1.23
#14	SSC:8	Bolted Double Lap	12.849	14.820	-6.549	0.81	10^3 cyc	0.56	0.92	1.39	0.23	0.67	0.71	0.54	2.03	1.6	3.96
							10^8 cyc	0.62	0.57	0.29	0.43	0.15	0.86	0.22	0.58	0.54	0.49
#15	SSC:9	Riveted Single Lap	14.887	17.790	-9.643	0.90	10^3 cyc	1.2	1.97	2.98	0.49	1.43	1.52	1.15	4.36	3.44	8.47
							10^8 cyc	0.76	0.7	0.35	0.53	0.18	1.05	0.27	0.7	0.66	0.6
#16	SSC:10M	Butt Weld Axial:Mild Steel	12.585	14.870	-7.589	0.88	10^3 cyc	1.03	1.69	2.55	0.42	1.23	1.3	0.98	3.73	2.94	7.25
							10^8 cyc	0.9	0.83	0.42	0.62	0.21	1.24	0.32	0.83	0.78	0.71
#17	SSC:10H	Butt Weld Axial:HSLA Steel	20.148	24.000	-12.795	0.96	10^3 cyc	1.05	1.72	2.59	0.43	1.25	1.33	1	3.79	2.99	7.37
							10^8 cyc	0.49	0.45	0.23	0.34	0.12	0.68	0.17	0.46	0.43	0.39
#18	SSC:10Q	Butt Weld Axial:Q&T Steel	10.588	12.130	-5.124	0.76	10^3 cyc	0.55	0.9	1.35	0.22	0.65	0.69	0.52	1.98	1.56	3.85
							10^8 cyc	0.99	0.91	0.46	0.69	0.24	1.37	0.35	0.92	0.86	0.78
#19	SSC:10(G)	Butt Weld Axial:Ground	12.904	15.050	-7.130	0.94	10^3 cyc	0.75	1.24	1.86	0.31	0.9	0.95	0.72	2.73	2.15	5.31
							10^8 cyc	0.72	0.67	0.34	0.5	0.17	1	0.26	0.67	0.63	0.57
#20	SSC:10A	Butt Weld Bndg	10.914	12.560	-5.468	0.79	10^3 cyc	0.6	0.99	1.49	0.25	0.72	0.76	0.58	2.18	1.72	4.25
							10^8 cyc	0.95	0.87	0.44	0.66	0.23	1.31	0.34	0.88	0.82	0.75
#21	SSC:11	I-Bm Butt Weld Bndg	10.675	12.410	-5.765	0.68	10^3 cyc	0.8	1.31	1.98	0.33	0.95	1.01	0.77	2.9	2.29	5.64
							10^8 cyc	1.13	1.04	0.53	0.78	0.27	1.56	0.4	1.05	0.98	0.9
#22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	9.506	10.830	-4.398	0.43	10^3 cyc	0.52	0.86	1.3	0.21	0.62	0.66	0.5	1.9	1.5	3.69
							10^8 cyc	1.37	1.27	0.64	0.95	0.33	1.9	0.49	1.27	1.19	1.09
#23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	11.215	12.920	-5.663	0.60	10^3 cyc	0.6	0.99	1.5	0.25	0.72	0.77	0.58	2.19	1.73	4.26
							10^8 cyc	0.88	0.81	0.41	0.61	0.21	1.22	0.31	0.82	0.77	0.7
#24	SSC:13	Tee Stiffener Taped Flg Width Bndg	9.947	11.220	-4.229	0.45	10^3 cyc	0.36	0.58	0.88	0.15	0.42	0.45	0.34	1.29	1.02	2.5
							10^8 cyc	1.03	0.95	0.48	0.72	0.25	1.43	0.37	0.96	0.89	0.82
#25	SSC:14	Disc. Cruciform Axial	12.901	15.140	-7.439	0.91	10^3 cyc	0.87	1.43	2.16	0.36	1.04	1.11	0.84	3.16	2.5	6.15
							10^8 cyc	0.79	0.72	0.37	0.54	0.19	1.09	0.28	0.73	0.68	0.62
#26	SSC:15	Loaded Edge Attachment Plate	8.706	9.970	-4.200	0.43	10^3 cyc	0.68	1.12	1.69	0.28	0.81	0.86	0.65	2.47	1.95	4.8
							10^8 cyc	2.02	1.86	0.94	1.4	0.48	2.8	0.72	1.88	1.75	1.6
#27	SSC:16	Partial Pen. Butt Weld	9.466	10.860	-4.631	0.58	10^3 cyc	0.64	1.06	1.59	0.26	0.77	0.82	0.62	2.33	1.84	4.54
							10^8 cyc	1.48	1.36	0.69	1.03	0.35	2.05	0.52	1.37	1.28	1.17
#28	SSC:16(G)	Partial Pen. Butt Weld: Ground	11.555	13.650	-6.960	0.95	10^3 cyc	1.08	1.77	2.67	0.44	1.29	1.37	1.03	3.91	3.08	7.6
							10^8 cyc	1.08	1	0.5	0.75	0.26	1.5	0.38	1	0.93	0.86
#29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	8.585	9.710	-3.736	0.34	10^3 cyc	0.48	0.79	1.19	0.2	0.57	0.61	0.46	1.75	1.38	3.39
							10^8 cyc	2.01	1.85	0.93	1.39	0.48	2.78	0.71	1.86	1.74	1.59
#30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	1.1	1.8	2.72	0.45	1.31	1.39	1.05	3.98	3.14	7.74
							10^8 cyc	0.92	0.85	0.43	0.64	0.22	1.28	0.33	0.86	0.8	0.73
#31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	8.317	9.360	-3.465	0.39	10^3 cyc	0.43	0.71	1.07	0.18	0.51	0.55	0.41	1.56	1.23	3.03
							10^8 cyc	2.29	2.11	1.06	1.58	0.55	3.16	0.81	2.12	1.98	1.81
#32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.65	10^3 cyc	1.1	1.8	2.72	0.45	1.31	1.39	1.05	3.98	3.14	7.74
							10^8 cyc	0.92	0.85	0.43	0.64	0.22	1.28	0.33	0.86	0.8	0.73
#33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	7.748	8.960	-4.027	0.65	10^3 cyc	1.02	1.67	2.52	0.42	1.21	1.29	0.97	3.69	2.91	7.18
							10^8 cyc	3.4	3.13	1.58	2.36	0.81	4.71	1.2	3.16	2.94	2.7
#34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	13.741	16.520	-9.233	0.75	10^3 cyc	1.39	2.28	3.44	0.57	1.65	1.76	1.33	5.03	3.97	9.78
							10^8 cyc	0.93	0.85	0.43	0.64	0.22	1.28	0.33	0.86	0.8	0.73
#35	SSC:19	Lapped Flatbar End Weld Only: Axial	11.081	13.330	-7.472	0.93	10^3 cyc	1.55	2.55	3.85	0.64	1.85	1.97	1.49	5.63	4.44	10.95
							10^8 cyc	1.39	1.28	0.65	0.96	0.33	1.92	0.49	1.29	1.2	1.1

	BASELINE CONFIGURATION		LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #61	#62	#63	#64	#65	#66	#67	#68	#69	#70
#36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	11.706	13.970	-7.520	0.93	10^3 cyc	1.31	2.14	3.23	0.53	1.56	1.66	1.25	4.73	3.73	9.21
							10^8 cyc	1.16	1.07	0.54	0.8	0.28	1.6	0.41	1.07	1	0.92
#37	SSC:20	Plate Penetration: Axial	8.860	10.250	-4.619	0.66	10^3 cyc	0.86	1.42	2.14	0.35	1.03	1.09	0.83	3.13	2.47	6.08
							10^8 cyc	2	1.84	0.93	1.38	0.48	2.76	0.71	1.85	1.73	1.58
#38	SSC:20(S)	Plate Penetration: Shear	10.835	12.870	-6.759	0.93	10^3 cyc	1.25	2.06	3.11	0.51	1.5	1.59	1.2	4.55	3.59	8.84
							10^8 cyc	1.32	1.22	0.61	0.91	0.32	1.83	0.47	1.22	1.14	1.05
#39	SSC:21(1/4"WELD)	Plate Penetration: Bending	21.192	25.480	-14.245	0.62	10^3 cyc	1.26	2.07	3.12	0.52	1.5	1.6	1.21	4.57	3.61	8.9
							10^8 cyc	0.54	0.5	0.25	0.38	0.13	0.75	0.19	0.5	0.47	0.43
#40	SSC:21(3/8"WELD)	Plate Penetration: Bending	19.586	24.250	-15.494	0.62	10^3 cyc	2.1	3.45	5.2	0.86	2.5	2.66	2.01	7.61	6.01	14.81
							10^8 cyc	0.85	0.78	0.39	0.59	0.2	1.17	0.3	0.78	0.73	0.67
#41	SSC:21(S)	Plate Penetration: Shear	13.105	15.320	-7.358	0.83	10^3 cyc	0.79	1.29	1.95	0.32	0.94	1	0.76	2.86	2.26	5.56
							10^8 cyc	0.72	0.67	0.34	0.5	0.17	1	0.26	0.67	0.62	0.57
#42	SSC:22	Tee with Stud Attachment: Bndg	8.453	9.400	-3.147	0.32	10^3 cyc	0.27	0.44	0.66	0.11	0.32	0.34	0.25	0.96	0.76	1.87
							10^8 cyc	1.98	1.82	0.92	1.37	0.47	2.73	0.7	1.83	1.71	1.57
#43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.23	0.38	0.57	0.09	0.28	0.29	0.22	0.84	0.66	1.63
							10^8 cyc	1.64	1.51	0.76	1.14	0.39	2.27	0.58	1.52	1.42	1.3
#44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.721	9.680	-3.187	0.13	10^3 cyc	0.23	0.38	0.57	0.09	0.28	0.29	0.22	0.84	0.66	1.63
							10^8 cyc	1.64	1.51	0.76	1.14	0.39	2.27	0.58	1.52	1.42	1.3
#45	SSC:25	Continuous Cruciform	12.096	14.230	-7.090	0.78	10^3 cyc	0.96	1.57	2.37	0.39	1.14	1.22	0.92	3.48	2.74	6.76
							10^8 cyc	0.93	0.86	0.43	0.65	0.22	1.29	0.33	0.86	0.81	0.74
#46	SSC:25A	Plate with Transv. Side Attachment	15.086	17.650	-8.518	0.91	10^3 cyc	0.75	1.23	1.85	0.31	0.89	0.95	0.72	2.71	2.14	5.27
							10^8 cyc	0.55	0.51	0.26	0.38	0.13	0.77	0.2	0.51	0.48	0.44
#47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	11.793	13.890	-6.966	0.63	10^3 cyc	1	1.64	2.48	0.41	1.19	1.27	0.96	3.62	2.86	7.05
							10^8 cyc	1	0.92	0.46	0.69	0.24	1.38	0.35	0.93	0.86	0.79
#48	SSC:26	Welded Cover Plate	7.902	8.910	-3.348	0.61	10^3 cyc	0.5	0.82	1.24	0.21	0.6	0.64	0.48	1.82	1.43	3.53
							10^8 cyc	2.99	2.76	1.39	2.07	0.72	4.14	1.06	2.78	2.59	2.37
#49	SSC:27	Double Lapped Plate with Plug Welds	7.293	8.240	-3.146	0.58	10^3 cyc	0.62	1.02	1.54	0.25	0.74	0.79	0.59	2.25	1.77	4.37
							10^8 cyc	4.62	4.25	2.15	3.2	1.1	6.39	1.63	4.28	3.99	3.66
#50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	9.391	10.980	-5.277	0.54	10^3 cyc	1.03	1.68	2.54	0.42	1.22	1.3	0.98	3.72	2.93	7.23
							10^8 cyc	1.74	1.6	0.81	1.21	0.42	2.41	0.62	1.62	1.51	1.38
#51	SSC:28	Baseplate with Circular Hole	13.458	15.790	-7.746	0.81	10^3 cyc	0.85	1.39	2.1	0.35	1.01	1.07	0.81	3.07	2.42	5.97
							10^8 cyc	0.72	0.66	0.33	0.5	0.17	0.99	0.25	0.67	0.62	0.57
#52	SSC:30	Long Finite Plate Attchmnt: Axial	8.299	9.250	-3.159	0.31	10^3 cyc	0.3	0.5	0.75	0.12	0.36	0.38	0.29	1.1	0.86	2.13
							10^8 cyc	2.22	2.04	1.03	1.53	0.53	3.07	0.78	2.05	1.92	1.76
#53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.366	10.380	-3.368	0.10	10^3 cyc	0.19	0.31	0.47	0.08	0.22	0.24	0.18	0.68	0.54	1.33
							10^8 cyc	1.1	1.01	0.51	0.76	0.26	1.52	0.39	1.02	0.95	0.87
#54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	8.121	9.430	-4.348	0.62	10^3 cyc	1.04	1.71	2.59	0.43	1.24	1.32	1	3.78	2.99	7.36
							10^8 cyc	2.83	2.6	1.31	1.96	0.68	3.91	1	2.62	2.44	2.24
#55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	8.211	9.250	-3.453	0.44	10^3 cyc	0.46	0.75	1.13	0.19	0.54	0.58	0.44	1.65	1.3	3.21
							10^8 cyc	2.45	2.26	1.14	1.7	0.59	3.39	0.87	2.27	2.12	1.94
#56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	8.706	9.970	-4.200	0.43	10^3 cyc	0.68	1.12	1.69	0.28	0.81	0.86	0.65	2.47	1.95	4.8
							10^8 cyc	2.02	1.86	0.94	1.4	0.48	2.8	0.72	1.88	1.75	1.6
#57	SSC:32B	Abrupt Change in Flange Width:Bndg	7.406	8.470	-3.533	0.62	10^3 cyc	0.84	1.38	2.08	0.34	1	1.06	0.8	3.04	2.4	5.91
							10^8 cyc	4.18	3.85	1.94	2.9	1	5.78	1.48	3.88	3.62	3.31
#58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	7.758	8.860	-3.660	0.50	10^3 cyc	0.75	1.23	1.86	0.31	0.89	0.95	0.72	2.72	2.14	5.29
							10^8 cyc	3.34	3.07	1.55	2.31	0.8	4.62	1.18	3.1	2.89	2.65
#59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	14.849	17.970	-10.368	0.81	10^3 cyc	1.52	2.49	3.76	0.62	1.81	1.93	1.46	5.51	4.34	10.71
							10^8 cyc	0.88	0.81	0.41	0.61	0.21	1.22	0.31	0.82	0.76	0.7
#60	SSC:35	Butt Weld with Backing Bar	9.044	10.190	-3.808	0.28	10^3 cyc	0.39	0.64	0.97	0.16	0.47	0.5	0.37	1.42	1.12	2.76
							10^8 cyc	1.54	1.42	0.72	1.07	0.37	2.13	0.55	1.43	1.33	1.22
#61	SSC:36	Skip Welded Plates with Rathole	11.793	13.890	-6.966	0.63	10^3 cyc	1	1.64	2.48	0.41	1.19	1.27	0.96	3.62	2.86	7.05
							10^8 cyc	1	0.92	0.46	0.69	0.24	1.38	0.35	0.93	0.86	0.79
#62	SSC:36A	Skip Welded Plates	10.406	11.960	-5.163	0.46	10^3 cyc	0.61	1	1.51	0.25	0.73	0.77	0.58	2.21	1.74	4.3
							10^8 cyc	1.09	1	0.5	0.75	0.26	1.5	0.38	1.01	0.94	0.86
#63	SSC:38	Stiffener Plate Penetration: Bndg	8.408	9.450	-3.462	0.36	10^3 cyc	0.4	0.66	1	0.17	0.48	0.51	0.39	1.46	1.15	2.85
							10^8 cyc	2.15	1.98	1	1.49	0.51	2.98	0.76	2	1.86	1.71
#64	SSC:38(S)	Stiffener Plate Penetration: Shear	12.552	15.630	-10.225	0.88	10^3 cyc	2.44	4.01	6.05	1	2.91	3.1	2.34	8.86	6.99	17.22
							10^8 cyc	1.44	1.33	0.67	1	0.35	2	0.51	1.34	1.25	1.14
#65	SSC:40	Stiffener Intersection: Bending	7.406	8.470	-3.533	0.62	10^3 cyc	0.84	1.38	2.08	0.34	1	1.06	0.8	3.04	2.4	5.91
							10^8 cyc	4.18	3.85	1.94	2.9	1	5.78	1.48	3.88	3.62	3.31
#66	SSC:42	Bending of Long Attachment	13.105	15.320	-7.358	0.83	10^3 cyc	0.79	1.29	1.95	0.32	0.94	1	0.76	2.86	2.26	5.56
							10^8 cyc	0.72	0.67	0.34	0.5	0.17	1	0.26	0.67	0.62	0.57
#67	SSC:46	Long. Welds on Support Gussets: Axial	8.121	9.430	-4.348	0.62	10^3 cyc	1.04	1.71	2.59	0.43	1.24	1.32	1	3.78	2.99	7.36
							10^8 cyc	2.83	2.6	1.31	1.96	0.68	3.91	1	2.62	2.44	2.24
#68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.641	10.790	-3.818	0.07	10^3 cyc	0.28	0.45	0.68	0.11	0.33	0.35	0.26	1	0.79	1.94
							10^8 cyc	1.08	0.99	0.5	0.75	0.26	1.49	0.38	1	0.93	0.85
#69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	9.643	10.860	-4.042	0.19	10^3 cyc	0.35	0.57	0.87	0.14	0.42	0.44	0.33	1.27	1	2.47
							10^8 cyc	1.16	1.07	0.54	0.8	0.28	1.6	0.41	1.07	1	0.92
#70	Generic S/N Curve		9.000	9.903	-3.000	0.00	10^3 cyc	0.14	0.23	0.35	0.06	0.17	0.18	0.14	0.51	0.41	1
							10^8 cyc	1.26	1.16	0.59	0.87	0.3	1.75	0.45	1.17	1.09	1

Code Mean

Design Code RMS Fatigue Strength Ratios Associated with a 50% Probability of Failure

	BASELINE CONFIGURATION	LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #1	#2	#3	#4	#5	#6	#7	#8	#9	#10
#1	AASHTO S/N CURVE: A	9.94	10.843	-3.000	0.221	10^3 cyc	1	0.7	0.44	0.37	0.29	0.25	0.29	0.38	0.42	0.52
						10^8 cyc	1	0.7	0.44	0.37	0.29	0.25	0.29	0.38	0.42	0.52
#2	AASHTO S/N CURVE: B	9.471	10.374	-3.000	0.147	10^3 cyc	1.43	1	0.63	0.53	0.42	0.36	0.42	0.54	0.61	0.75
						10^8 cyc	1.43	1	0.63	0.53	0.42	0.36	0.42	0.54	0.61	0.75
#3	AASHTO S/N CURVE: C	8.875	9.778	-3.000	0.063	10^3 cyc	2.26	1.58	1	0.84	0.66	0.57	0.66	0.86	0.96	1.19
						10^8 cyc	2.26	1.58	1	0.84	0.66	0.57	0.66	0.86	0.96	1.19
#4	AASHTO S/N CURVE: D	8.648	9.551	-3.000	0.108	10^3 cyc	2.7	1.88	1.19	1	0.78	0.68	0.79	1.02	1.14	1.41
						10^8 cyc	2.7	1.88	1.19	1	0.78	0.68	0.79	1.02	1.14	1.41
#5	AASHTO S/N CURVE: E	8.329	9.232	-3.000	0.101	10^3 cyc	3.44	2.4	1.52	1.28	1	0.87	1.01	1.3	1.46	1.81
						10^8 cyc	3.44	2.4	1.52	1.28	1	0.87	1.01	1.3	1.46	1.81
#6	BS5400 S/N CURVE: W	8.150	9.054	-3.000	0.184	10^3 cyc	3.95	2.76	1.74	1.47	1.15	1	1.16	1.49	1.67	2.07
						10^8 cyc	3.95	2.76	1.74	1.47	1.15	1	1.16	1.49	1.67	2.07
#7	BS5400 S/N CURVE: G	8.338	9.241	-3.000	0.179	10^3 cyc	3.42	2.39	1.51	1.27	0.99	0.87	1	1.29	1.45	1.79
						10^8 cyc	3.42	2.39	1.51	1.27	0.99	0.87	1	1.29	1.45	1.79
#8	BS5400 S/N CURVE: F2	8.672	9.575	-3.000	0.228	10^3 cyc	2.65	1.85	1.17	0.98	0.77	0.67	0.77	1	1.12	1.39
						10^8 cyc	2.65	1.85	1.17	0.98	0.77	0.67	0.77	1	1.12	1.39
#9	BS5400 S/N CURVE: F	8.820	9.723	-3.000	0.218	10^3 cyc	2.36	1.65	1.04	0.88	0.69	0.6	0.69	0.89	1	1.24
						10^8 cyc	2.36	1.65	1.04	0.88	0.69	0.6	0.69	0.89	1	1.24
#10	BS5400 S/N CURVE: E	9.099	10.003	-3.000	0.251	10^3 cyc	1.91	1.33	0.84	0.71	0.55	0.48	0.56	0.72	0.81	1
						10^8 cyc	1.91	1.33	0.84	0.71	0.55	0.48	0.56	0.72	0.81	1
#11	BS5400 S/N CURVE: D	9.183	10.086	-3.000	0.210	10^3 cyc	1.79	1.25	0.79	0.66	0.52	0.45	0.52	0.68	0.76	0.94
						10^8 cyc	1.79	1.25	0.79	0.66	0.52	0.45	0.52	0.68	0.76	0.94
#12	BS5400 S/N CURVE: C	10.046	11.100	-3.500	0.204	10^3 cyc	2.08	1.45	0.92	0.77	0.6	0.53	0.61	0.79	0.88	1.09
						10^8 cyc	1.2	0.84	0.53	0.45	0.35	0.3	0.35	0.45	0.51	0.63
#13	BS5400 S/N CURVE: B	10.812	12.016	-4.000	0.182	10^3 cyc	2.48	1.73	1.09	0.92	0.72	0.63	0.73	0.94	1.05	1.3
						10^8 cyc	0.95	0.66	0.42	0.35	0.28	0.24	0.28	0.36	0.4	0.5
#14	BS5400 S/N CURVE: S	14.214	16.623	-8.000	0.504	10^3 cyc	11.04	7.7	4.87	4.09	3.21	2.79	3.23	4.17	4.67	5.79
						10^8 cyc	1	0.7	0.44	0.37	0.29	0.25	0.29	0.38	0.42	0.53
#15	DnV S/N CURVE: B	10.813	12.017	-4.000	0.182	10^3 cyc	2.48	1.73	1.09	0.92	0.72	0.63	0.72	0.94	1.05	1.3
						10^8 cyc	0.95	0.66	0.42	0.35	0.28	0.24	0.28	0.36	0.4	0.5
#16	DnV S/N CURVE: C	10.047	11.100	-3.500	0.204	10^3 cyc	2.08	1.45	0.92	0.77	0.6	0.53	0.61	0.79	0.88	1.09
						10^8 cyc	1.2	0.84	0.53	0.45	0.35	0.3	0.35	0.45	0.51	0.63
#17	DnV S/N CURVE: D	9.183	10.086	-3.000	0.210	10^3 cyc	1.79	1.25	0.79	0.66	0.52	0.45	0.52	0.68	0.76	0.94
						10^8 cyc	1.79	1.25	0.79	0.66	0.52	0.45	0.52	0.68	0.76	0.94
#18	DnV S/N CURVE: E	9.099	10.002	-3.000	0.251	10^3 cyc	1.91	1.33	0.84	0.71	0.55	0.48	0.56	0.72	0.81	1
						10^8 cyc	1.91	1.33	0.84	0.71	0.55	0.48	0.56	0.72	0.81	1
#19	DnV S/N CURVE: F	8.819	9.722	-3.000	0.218	10^3 cyc	2.36	1.65	1.04	0.88	0.69	0.6	0.69	0.89	1	1.24
						10^8 cyc	2.36	1.65	1.04	0.88	0.69	0.6	0.69	0.89	1	1.24
#20	DnV S/N CURVE: F2	8.672	9.575	-3.000	0.228	10^3 cyc	2.65	1.85	1.17	0.98	0.77	0.67	0.77	1	1.12	1.39
						10^8 cyc	2.65	1.85	1.17	0.98	0.77	0.67	0.77	1	1.12	1.39
#21	DnV S/N CURVE: G	8.335	9.238	-3.000	0.179	10^3 cyc	3.43	2.39	1.51	1.27	1	0.87	1	1.3	1.45	1.8
						10^8 cyc	3.43	2.39	1.51	1.27	1	0.87	1	1.3	1.45	1.8
#22	DnV S/N CURVE: W	8.148	9.052	-3.000	0.185	10^3 cyc	3.96	2.76	1.75	1.47	1.15	1	1.16	1.5	1.67	2.07
						10^8 cyc	3.96	2.76	1.75	1.47	1.15	1	1.16	1.5	1.67	2.07
#23	DnV S/N CURVE: T	9.243	10.146	-3.000	0.248	10^3 cyc	1.71	1.19	0.75	0.63	0.5	0.43	0.5	0.65	0.72	0.9
						10^8 cyc	1.71	1.19	0.75	0.63	0.5	0.43	0.5	0.65	0.72	0.9
#24	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	2.06	1.44	0.91	0.76	0.6	0.52	0.6	0.78	0.87	1.08
						10^8 cyc	2.06	1.44	0.91	0.76	0.6	0.52	0.6	0.78	0.87	1.08

Code Mean

	BASELINE CONFIGURATION	LOG(Aamp) (ksi)	LOG(Arng) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #11	#12	#13	#14	#15	#16	#17	#18	#19	#20
#1	AASHTO S/N CURVE: A	9.940	10.843	-3.000	0.221	10^3 cyc	0.56	0.48	0.4	0.09	0.4	0.48	0.56	0.52	0.42	0.38
						10^8 cyc	0.56	0.83	1.05	1	1.05	0.83	0.56	0.52	0.42	0.38
#2	AASHTO S/N CURVE: B	9.471	10.374	-3.000	0.147	10^3 cyc	0.8	0.69	0.58	0.13	0.58	0.69	0.8	0.75	0.61	0.54
						10^8 cyc	0.8	1.19	1.51	1.43	1.51	1.19	0.8	0.75	0.61	0.54
#3	AASHTO S/N CURVE: C	8.875	9.778	-3.000	0.063	10^3 cyc	1.27	1.09	0.91	0.21	0.91	1.09	1.27	1.19	0.96	0.86
						10^8 cyc	1.27	1.88	2.38	2.26	2.39	1.89	1.27	1.19	0.96	0.86
#4	AASHTO S/N CURVE: D	8.648	9.551	-3.000	0.108	10^3 cyc	1.51	1.3	1.09	0.24	1.09	1.3	1.51	1.41	1.14	1.02
						10^8 cyc	1.51	2.24	2.84	2.69	2.84	2.24	1.51	1.41	1.14	1.02
#5	AASHTO S/N CURVE: E	8.329	9.232	-3.000	0.101	10^3 cyc	1.93	1.66	1.39	0.31	1.39	1.66	1.93	1.81	1.46	1.3
						10^8 cyc	1.93	2.87	3.62	3.43	3.63	2.87	1.93	1.81	1.46	1.3
#6	BS5400 S/N CURVE: W	8.150	9.054	-3.000	0.184	10^3 cyc	2.21	1.9	1.59	0.36	1.59	1.9	2.21	2.07	1.67	1.49
						10^8 cyc	2.21	3.29	4.16	3.94	4.16	3.29	2.21	2.07	1.67	1.49
#7	BS5400 S/N CURVE: G	8.338	9.241	-3.000	0.179	10^3 cyc	1.91	1.64	1.38	0.31	1.38	1.65	1.91	1.79	1.45	1.29
						10^8 cyc	1.91	2.85	3.6	3.41	3.6	2.85	1.91	1.79	1.45	1.29
#8	BS5400 S/N CURVE: F2	8.672	9.575	-3.000	0.228	10^3 cyc	1.48	1.27	1.07	0.24	1.07	1.27	1.48	1.39	1.12	1
						10^8 cyc	1.48	2.2	2.79	2.64	2.79	2.2	1.48	1.39	1.12	1
#9	BS5400 S/N CURVE: F	8.820	9.723	-3.000	0.218	10^3 cyc	1.32	1.14	0.95	0.21	0.95	1.14	1.32	1.24	1	0.89
						10^8 cyc	1.32	1.97	2.49	2.36	2.49	1.97	1.32	1.24	1	0.89
#10	BS5400 S/N CURVE: E	9.099	10.003	-3.000	0.251	10^3 cyc	1.07	0.92	0.77	0.17	0.77	0.92	1.07	1	0.81	0.72
						10^8 cyc	1.07	1.59	2.01	1.9	2.01	1.59	1.07	1	0.81	0.72
#11	BS5400 S/N CURVE: D	9.183	10.086	-3.000	0.210	10^3 cyc	1	0.86	0.72	0.16	0.72	0.86	1	0.94	0.76	0.68
						10^8 cyc	1	1.49	1.88	1.78	1.88	1.49	1	0.94	0.76	0.68
#12	BS5400 S/N CURVE: C	10.046	11.100	-3.500	0.204	10^3 cyc	1.16	1	0.84	0.19	0.84	1	1.16	1.09	0.88	0.79
						10^8 cyc	0.67	1	1.27	1.2	1.27	1	0.67	0.63	0.51	0.45
#13	BS5400 S/N CURVE: B	10.812	12.016	-4.000	0.182	10^3 cyc	1.39	1.19	1	0.22	1	1.19	1.39	1.3	1.05	0.94
						10^8 cyc	0.53	0.79	1	0.95	1	0.79	0.53	0.5	0.4	0.36
#14	BS5400 S/N CURVE: S	14.214	16.623	-8.000	0.504	10^3 cyc	6.17	5.31	4.45	1	4.45	5.31	6.17	5.79	4.67	4.17
						10^8 cyc	0.56	0.83	1.06	1	1.06	0.83	0.56	0.53	0.42	0.38
#15	DnV S/N CURVE: B	10.813	12.017	-4.000	0.182	10^3 cyc	1.39	1.19	1	0.22	1	1.19	1.39	1.3	1.05	0.94
						10^8 cyc	0.53	0.79	1	0.95	1	0.79	0.53	0.5	0.4	0.36
#16	DnV S/N CURVE: C	10.047	11.100	-3.500	0.204	10^3 cyc	1.16	1	0.84	0.19	0.84	1	1.16	1.09	0.88	0.79
						10^8 cyc	0.67	1	1.26	1.2	1.27	1	0.67	0.63	0.51	0.45
#17	DnV S/N CURVE: D	9.183	10.086	-3.000	0.210	10^3 cyc	1	0.86	0.72	0.16	0.72	0.86	1	0.94	0.76	0.68
						10^8 cyc	1	1.49	1.88	1.78	1.88	1.49	1	0.94	0.76	0.68
#18	DnV S/N CURVE: E	9.099	10.002	-3.000	0.251	10^3 cyc	1.07	0.92	0.77	0.17	0.77	0.92	1.07	1	0.81	0.72
						10^8 cyc	1.07	1.59	2.01	1.9	2.01	1.59	1.07	1	0.81	0.72
#19	DnV S/N CURVE: F	8.819	9.722	-3.000	0.218	10^3 cyc	1.32	1.14	0.95	0.21	0.95	1.14	1.32	1.24	1	0.89
						10^8 cyc	1.32	1.97	2.49	2.36	2.49	1.97	1.32	1.24	1	0.89
#20	DnV S/N CURVE: F2	8.672	9.575	-3.000	0.228	10^3 cyc	1.48	1.27	1.07	0.24	1.07	1.27	1.48	1.39	1.12	1
						10^8 cyc	1.48	2.2	2.79	2.64	2.79	2.2	1.48	1.39	1.12	1
#21	DnV S/N CURVE: G	8.335	9.238	-3.000	0.179	10^3 cyc	1.92	1.65	1.38	0.31	1.38	1.65	1.92	1.8	1.45	1.3
						10^8 cyc	1.92	2.85	3.61	3.42	3.61	2.85	1.92	1.8	1.45	1.3
#22	DnV S/N CURVE: W	8.148	9.052	-3.000	0.185	10^3 cyc	2.21	1.9	1.6	0.36	1.6	1.9	2.21	2.07	1.67	1.5
						10^8 cyc	2.21	3.29	4.17	3.95	4.17	3.29	2.21	2.07	1.67	1.5
#23	DnV S/N CURVE: T	9.243	10.146	-3.000	0.248	10^3 cyc	0.95	0.82	0.69	0.15	0.69	0.82	0.95	0.9	0.72	0.65
						10^8 cyc	0.95	1.42	1.8	1.7	1.8	1.42	0.95	0.9	0.72	0.65
#24	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	1.15	0.99	0.83	0.19	0.83	0.99	1.15	1.08	0.87	0.78
						10^8 cyc	1.15	1.71	2.17	2.05	2.17	1.71	1.15	1.08	0.87	0.78

Code Mean

	BASELINE CONFIGURATION	LOG(Aamp) (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN; 50% PROBABILITY OF FAILURE) #21	#22	#23	#24
#1	AASHTO S/N CURVE: A	9.940	10.843	-3.000	0.221	10^3 cyc	0.29	0.25	0.59	0.49
						10^8 cyc	0.29	0.25	0.59	0.49
#2	AASHTO S/N CURVE: B	9.471	10.374	-3.000	0.147	10^3 cyc	0.42	0.36	0.84	0.7
						10^8 cyc	0.42	0.36	0.84	0.7
#3	AASHTO S/N CURVE: C	8.875	9.778	-3.000	0.063	10^3 cyc	0.66	0.57	1.33	1.1
						10^8 cyc	0.66	0.57	1.33	1.1
#4	AASHTO S/N CURVE: D	8.648	9.551	-3.000	0.108	10^3 cyc	0.79	0.68	1.58	1.31
						10^8 cyc	0.79	0.68	1.58	1.31
#5	AASHTO S/N CURVE: E	8.329	9.232	-3.000	0.101	10^3 cyc	1	0.87	2.02	1.67
						10^8 cyc	1	0.87	2.02	1.67
#6	BS5400 S/N CURVE: W	8.150	9.054	-3.000	0.184	10^3 cyc	1.15	1	2.31	1.92
						10^8 cyc	1.15	1	2.31	1.92
#7	BS5400 S/N CURVE: G	8.338	9.241	-3.000	0.179	10^3 cyc	1	0.86	2	1.66
						10^8 cyc	1	0.86	2	1.66
#8	BS5400 S/N CURVE: F2	8.672	9.575	-3.000	0.228	10^3 cyc	0.77	0.67	1.55	1.29
						10^8 cyc	0.77	0.67	1.55	1.29
#9	BS5400 S/N CURVE: F	8.820	9.723	-3.000	0.218	10^3 cyc	0.69	0.6	1.38	1.15
						10^8 cyc	0.69	0.6	1.38	1.15
#10	BS5400 S/N CURVE: E	9.099	10.003	-3.000	0.251	10^3 cyc	0.56	0.48	1.12	0.93
						10^8 cyc	0.56	0.48	1.12	0.93
#11	BS5400 S/N CURVE: D	9.183	10.086	-3.000	0.210	10^3 cyc	0.52	0.45	1.05	0.87
						10^8 cyc	0.52	0.45	1.05	0.87
#12	BS5400 S/N CURVE: C	10.046	11.100	-3.500	0.204	10^3 cyc	0.61	0.53	1.22	1.01
						10^8 cyc	0.35	0.3	0.7	0.58
#13	BS5400 S/N CURVE: B	10.812	12.016	-4.000	0.182	10^3 cyc	0.72	0.63	1.45	1.21
						10^8 cyc	0.28	0.24	0.56	0.46
#14	BS5400 S/N CURVE: S	14.214	16.623	-8.000	0.504	10^3 cyc	3.22	2.79	6.46	5.36
						10^8 cyc	0.29	0.25	0.59	0.49
#15	DnV S/N CURVE: B	10.813	12.017	-4.000	0.182	10^3 cyc	0.72	0.63	1.45	1.2
						10^8 cyc	0.28	0.24	0.56	0.46
#16	DnV S/N CURVE: C	10.047	11.100	-3.500	0.204	10^3 cyc	0.61	0.53	1.22	1.01
						10^8 cyc	0.35	0.3	0.7	0.58
#17	DnV S/N CURVE: D	9.183	10.086	-3.000	0.210	10^3 cyc	0.52	0.45	1.05	0.87
						10^8 cyc	0.52	0.45	1.05	0.87
#18	DnV S/N CURVE: E	9.099	10.002	-3.000	0.251	10^3 cyc	0.56	0.48	1.12	0.93
						10^8 cyc	0.56	0.48	1.12	0.93
#19	DnV S/N CURVE: F	8.819	9.722	-3.000	0.218	10^3 cyc	0.69	0.6	1.38	1.15
						10^8 cyc	0.69	0.6	1.38	1.15
#20	DnV S/N CURVE: F2	8.672	9.575	-3.000	0.228	10^3 cyc	0.77	0.67	1.55	1.29
						10^8 cyc	0.77	0.67	1.55	1.29
#21	DnV S/N CURVE: G	8.335	9.238	-3.000	0.179	10^3 cyc	1	0.87	2.01	1.67
						10^8 cyc	1	0.87	2.01	1.67
#22	DnV S/N CURVE: W	8.148	9.052	-3.000	0.185	10^3 cyc	1.15	1	2.32	1.92
						10^8 cyc	1.15	1	2.32	1.92
#23	DnV S/N CURVE: T	9.243	10.146	-3.000	0.248	10^3 cyc	0.5	0.43	1	0.83
						10^8 cyc	0.5	0.43	1	0.83
#24	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	0.6	0.52	1.21	1
						10^8 cyc	0.6	0.52	1.21	1

Design Code RMS Fatigue Strength Ratios Associated with a 2.3% Probability of Failure

	BASELINE CONFIGURATION	LOG(Aamp (ksi)	LOG(Arng) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #1	#2	#3	#4	#5	#6	#7	#8	#9	#10
#1	AASHTO S/N CURVE: A	9.499	10.402	-3.000	0.221	10^3 cyc	1	0.78	0.56	0.44	0.35	0.27	0.31	0.37	0.43	0.5
						10^8 cyc	1	0.78	0.56	0.44	0.35	0.27	0.31	0.37	0.43	0.5
#2	AASHTO S/N CURVE: B	9.178	10.081	-3.000	0.147	10^3 cyc	1.28	1	0.72	0.56	0.45	0.34	0.4	0.48	0.54	0.64
						10^8 cyc	1.28	1	0.72	0.56	0.45	0.34	0.4	0.48	0.54	0.64
#3	AASHTO S/N CURVE: C	8.750	9.653	-3.000	0.063	10^3 cyc	1.78	1.39	1	0.78	0.62	0.48	0.55	0.66	0.76	0.89
						10^8 cyc	1.78	1.39	1	0.78	0.62	0.48	0.55	0.66	0.76	0.89
#4	AASHTO S/N CURVE: D	8.433	9.336	-3.000	0.108	10^3 cyc	2.27	1.77	1.28	1	0.79	0.61	0.71	0.85	0.96	1.14
						10^8 cyc	2.27	1.77	1.28	1	0.79	0.61	0.71	0.85	0.96	1.14
#5	AASHTO S/N CURVE: E	8.128	9.031	-3.000	0.101	10^3 cyc	2.86	2.24	1.61	1.26	1	0.77	0.89	1.07	1.22	1.43
						10^8 cyc	2.86	2.24	1.61	1.26	1	0.77	0.89	1.07	1.22	1.43
#6	BS5400 S/N CURVE: W	7.782	8.685	-3.000	0.184	10^3 cyc	3.73	2.92	2.1	1.65	1.3	1	1.16	1.4	1.59	1.87
						10^8 cyc	3.73	2.92	2.1	1.65	1.3	1	1.16	1.4	1.59	1.87
#7	BS5400 S/N CURVE: G	7.980	8.883	-3.000	0.179	10^3 cyc	3.21	2.51	1.8	1.41	1.12	0.86	1	1.2	1.36	1.61
						10^8 cyc	3.21	2.51	1.8	1.41	1.12	0.86	1	1.2	1.36	1.61
#8	BS5400 S/N CURVE: F2	8.217	9.120	-3.000	0.228	10^3 cyc	2.67	2.09	1.5	1.18	0.93	0.72	0.83	1	1.14	1.34
						10^8 cyc	2.67	2.09	1.5	1.18	0.93	0.72	0.83	1	1.14	1.34
#9	BS5400 S/N CURVE: F	8.384	9.287	-3.000	0.218	10^3 cyc	2.35	1.84	1.32	1.04	0.82	0.63	0.73	0.88	1	1.18
						10^8 cyc	2.35	1.84	1.32	1.04	0.82	0.63	0.73	0.88	1	1.18
#10	BS5400 S/N CURVE: E	8.597	9.500	-3.000	0.251	10^3 cyc	2	1.56	1.12	0.88	0.7	0.53	0.62	0.75	0.85	1
						10^8 cyc	2	1.56	1.12	0.88	0.7	0.53	0.62	0.75	0.85	1
#11	BS5400 S/N CURVE: D	8.764	9.667	-3.000	0.210	10^3 cyc	1.76	1.37	0.99	0.78	0.61	0.47	0.55	0.66	0.75	0.88
						10^8 cyc	1.76	1.37	0.99	0.78	0.61	0.47	0.55	0.66	0.75	0.88
#12	BS5400 S/N CURVE: C	9.638	10.691	-3.500	0.204	10^3 cyc	1.94	1.51	1.09	0.85	0.68	0.52	0.6	0.72	0.82	0.97
						10^8 cyc	1.12	0.88	0.63	0.49	0.39	0.3	0.35	0.42	0.48	0.56
#13	BS5400 S/N CURVE: B	10.447	11.651	-4.000	0.182	10^3 cyc	2.18	1.7	1.23	0.96	0.76	0.58	0.68	0.82	0.93	1.09
						10^8 cyc	0.83	0.65	0.47	0.37	0.29	0.22	0.26	0.31	0.36	0.42
#14	BS5400 S/N CURVE: S	13.205	15.614	-8.000	0.504	10^3 cyc	10.51	8.22	5.92	4.64	3.67	2.82	3.28	3.93	4.47	5.26
						10^8 cyc	0.96	0.75	0.54	0.42	0.33	0.26	0.3	0.36	0.41	0.48
#15	DnV S/N CURVE: B	10.449	11.653	-4.000	0.162	10^3 cyc	2.18	1.7	1.22	0.96	0.76	0.58	0.68	0.81	0.93	1.09
						10^8 cyc	0.83	0.65	0.47	0.37	0.29	0.22	0.26	0.31	0.35	0.42
#16	DnV S/N CURVE: C	9.639	10.692	-3.500	0.204	10^3 cyc	1.94	1.51	1.09	0.85	0.68	0.52	0.6	0.72	0.82	0.97
						10^8 cyc	1.12	0.87	0.63	0.49	0.39	0.3	0.35	0.42	0.48	0.56
#17	DnV S/N CURVE: D	8.764	9.667	-3.000	0.210	10^3 cyc	1.76	1.37	0.99	0.78	0.61	0.47	0.55	0.66	0.75	0.88
						10^8 cyc	1.76	1.37	0.99	0.78	0.61	0.47	0.55	0.66	0.75	0.88
#18	DnV S/N CURVE: E	8.597	9.500	-3.000	0.251	10^3 cyc	2	1.56	1.12	0.88	0.7	0.53	0.62	0.75	0.85	1
						10^8 cyc	2	1.56	1.12	0.88	0.7	0.53	0.62	0.75	0.85	1
#19	DnV S/N CURVE: F	8.383	9.286	-3.000	0.218	10^3 cyc	2.35	1.84	1.32	1.04	0.82	0.63	0.73	0.88	1	1.18
						10^8 cyc	2.35	1.84	1.32	1.04	0.82	0.63	0.73	0.88	1	1.18
#20	DnV S/N CURVE: F2	8.216	9.120	-3.000	0.228	10^3 cyc	2.68	2.09	1.51	1.18	0.93	0.72	0.83	1	1.14	1.34
						10^8 cyc	2.68	2.09	1.51	1.18	0.93	0.72	0.83	1	1.14	1.34
#21	DnV S/N CURVE: G	7.976	8.879	-3.000	0.179	10^3 cyc	3.22	2.51	1.81	1.42	1.12	0.86	1	1.2	1.37	1.61
						10^8 cyc	3.22	2.51	1.81	1.42	1.12	0.86	1	1.2	1.37	1.61
#22	DnV S/N CURVE: W	7.779	8.682	-3.000	0.185	10^3 cyc	3.74	2.92	2.11	1.65	1.31	1	1.17	1.4	1.59	1.87
						10^8 cyc	3.74	2.92	2.11	1.65	1.31	1	1.17	1.4	1.59	1.87
#23	DnV S/N CURVE: T	8.746	9.649	-3.000	0.248	10^3 cyc	1.78	1.39	1	0.79	0.62	0.48	0.56	0.67	0.76	0.89
						10^8 cyc	1.78	1.39	1	0.79	0.62	0.48	0.56	0.67	0.76	0.89
#24	EUROCODE S/N CURVE: 434	9.495	10.398	-3.000	n/a	10^3 cyc	1	0.78	0.56	0.44	0.35	0.27	0.31	0.37	0.43	0.5
						10^8 cyc	1	0.78	0.56	0.44	0.35	0.27	0.31	0.37	0.43	0.5
#25	EUROCODE S/N CURVE: 380	9.322	10.225	-3.000	n/a	10^3 cyc	1.14	0.89	0.64	0.51	0.4	0.31	0.36	0.43	0.49	0.57
						10^8 cyc	1.14	0.89	0.64	0.51	0.4	0.31	0.36	0.43	0.49	0.57
#26	EUROCODE S/N CURVE: 339	9.173	10.076	-3.000	n/a	10^3 cyc	1.28	1	0.72	0.57	0.45	0.34	0.4	0.48	0.55	0.64
						10^8 cyc	1.28	1	0.72	0.57	0.45	0.34	0.4	0.48	0.55	0.64
#27	EUROCODE S/N CURVE: 304	9.031	9.934	-3.000	n/a	10^3 cyc	1.43	1.12	0.81	0.63	0.5	0.38	0.45	0.54	0.61	0.72
						10^8 cyc	1.43	1.12	0.81	0.63	0.5	0.38	0.45	0.54	0.61	0.72
#28	EUROCODE S/N CURVE: 271	8.881	9.784	-3.000	n/a	10^3 cyc	1.61	1.26	0.9	0.71	0.56	0.43	0.5	0.6	0.68	0.8
						10^8 cyc	1.61	1.26	0.9	0.71	0.56	0.43	0.5	0.6	0.68	0.8
#29	EUROCODE S/N CURVE: 244	8.744	9.648	-3.000	n/a	10^3 cyc	1.78	1.39	1	0.79	0.62	0.48	0.56	0.67	0.76	0.89
						10^8 cyc	1.78	1.39	1	0.79	0.62	0.48	0.56	0.67	0.76	0.89
#30	EUROCODE S/N CURVE: 217	8.592	9.495	-3.000	n/a	10^3 cyc	2	1.57	1.13	0.88	0.7	0.54	0.63	0.75	0.85	1
						10^8 cyc	2	1.57	1.13	0.88	0.7	0.54	0.63	0.75	0.85	1
#31	EUROCODE S/N CURVE: 193	8.439	9.342	-3.000	n/a	10^3 cyc	2.25	1.76	1.27	0.99	0.79	0.6	0.7	0.84	0.96	1.13
						10^8 cyc	2.25	1.76	1.27	0.99	0.79	0.6	0.7	0.84	0.96	1.13
#32	EUROCODE S/N CURVE: 171	8.281	9.184	-3.000	n/a	10^3 cyc	2.54	1.99	1.43	1.12	0.89	0.68	0.79	0.95	1.08	1.27
						10^8 cyc	2.54	1.99	1.43	1.12	0.89	0.68	0.79	0.95	1.08	1.27
#33	EUROCODE S/N CURVE: 152	8.128	9.031	-3.000	n/a	10^3 cyc	2.86	2.24	1.61	1.26	1	0.77	0.89	1.07	1.22	1.43
						10^8 cyc	2.86	2.24	1.61	1.26	1	0.77	0.89	1.07	1.22	1.43
#34	EUROCODE S/N CURVE: 136	7.983	8.886	-3.000	n/a	10^3 cyc	3.2	2.5	1.8	1.41	1.12	0.86	1	1.2	1.36	1.6
						10^8 cyc	3.2	2.5	1.8	1.41	1.12	0.86	1	1.2	1.36	1.6
#35	EUROCODE S/N CURVE: 122	7.841	8.744	-3.000	n/a	10^3 cyc	3.57	2.79	2.01	1.57	1.25	0.96	1.11	1.33	1.52	1.79
						10^8 cyc	3.57	2.79	2.01	1.57	1.25	0.96	1.11	1.33	1.52	1.79
#36	EUROCODE S/N CURVE: 109	7.695	8.598	-3.000	n/a	10^3 cyc	3.99	3.12	2.25	1.76	1.39	1.07	1.24	1.49	1.7	2
						10^8 cyc	3.99	3.12	2.25	1.76	1.39	1.07	1.24	1.49	1.7	2
#37	EUROCODE S/N CURVE: 98	7.556	8.459	-3.000	n/a	10^3 cyc	4.44	3.47	2.5	1.96	1.55	1.19	1.38	1.66	1.89	2.22
						10^8 cyc	4.44	3.47	2.5	1.96	1.55	1.19	1.38	1.66	1.89	2.22
#38	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	1.47	1.15	0.82	0.65	0.51	0.39	0.46	0.55	0.62	0.73
						10^8 cyc	1.47	1.15	0.82	0.65	0.51	0.39	0.46	0.55	0.62	0.73

	BASELINE CONFIGURATION	LOG(Aamp (ksi)	LOG(Arng) (ksi)	B	STD DEV	RATIO @	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
							RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE)									
#1	AASHTO S/N CURVE: A	9.499	10.402	-3.000	n/a	10^3 cyc	0.57	0.52	0.46	0.1	0.46	0.52	0.57	0.5	0.42	0.37
						10^8 cyc	0.57	0.89	1.2	1.05	1.2	0.89	0.57	0.5	0.42	0.37
#2	AASHTO S/N CURVE: B	9.178	10.081	-3.000	n/a	10^3 cyc	0.73	0.66	0.59	0.12	0.59	0.66	0.73	0.64	0.54	0.48
						10^8 cyc	0.73	1.14	1.53	1.34	1.53	1.14	0.73	0.64	0.54	0.48
#3	AASHTO S/N CURVE: C	8.750	9.653	-3.000	n/a	10^3 cyc	1.01	0.92	0.82	0.17	0.82	0.92	1.01	0.89	0.76	0.66
						10^8 cyc	1.01	1.59	2.13	1.86	2.13	1.59	1.01	0.89	0.76	0.66
#4	AASHTO S/N CURVE: D	8.433	9.336	-3.000	n/a	10^3 cyc	1.29	1.17	1.04	0.22	1.04	1.17	1.29	1.14	0.96	0.85
						10^8 cyc	1.29	2.02	2.71	2.37	2.72	2.03	1.29	1.14	0.96	0.85
#5	AASHTO S/N CURVE: E	8.128	9.031	-3.000	n/a	10^3 cyc	1.63	1.48	1.31	0.27	1.32	1.48	1.63	1.43	1.22	1.07
						10^8 cyc	1.63	2.56	3.43	3	3.43	2.56	1.63	1.43	1.22	1.07
#6	BS5400 S/N CURVE: W	7.782	8.685	-3.000	0.184	10^3 cyc	2.12	1.93	1.71	0.36	1.71	1.93	2.12	1.87	1.59	1.4
						10^8 cyc	2.12	3.33	4.47	3.91	4.48	3.34	2.12	1.87	1.59	1.4
#7	BS5400 S/N CURVE: G	7.980	8.883	-3.000	0.179	10^3 cyc	1.83	1.66	1.47	0.31	1.47	1.66	1.83	1.61	1.36	1.2
						10^8 cyc	1.83	2.86	3.84	3.36	3.84	2.87	1.83	1.61	1.36	1.2
#8	BS5400 S/N CURVE: F2	8.217	9.120	-3.000	0.228	10^3 cyc	1.52	1.38	1.23	0.25	1.23	1.38	1.52	1.34	1.14	1
						10^8 cyc	1.52	2.39	3.2	2.8	3.21	2.39	1.52	1.34	1.14	1
#9	BS5400 S/N CURVE: F	8.384	9.287	-3.000	0.218	10^3 cyc	1.34	1.21	1.08	0.22	1.08	1.21	1.34	1.18	1	0.88
						10^8 cyc	1.34	2.1	2.82	2.46	2.82	2.1	1.34	1.18	1	0.88
#10	BS5400 S/N CURVE: E	8.597	9.500	-3.000	0.251	10^3 cyc	1.14	1.03	0.92	0.19	0.92	1.03	1.14	1	0.85	0.75
						10^8 cyc	1.14	1.78	2.39	2.09	2.39	1.78	1.14	1	0.85	0.75
#11	BS5400 S/N CURVE: D	8.764	9.667	-3.000	0.210	10^3 cyc	1	0.91	0.81	0.17	0.81	0.91	1	0.88	0.75	0.66
						10^8 cyc	1	1.57	2.1	1.84	2.11	1.57	1	0.88	0.75	0.66
#12	BS5400 S/N CURVE: C	9.638	10.691	-3.500	0.204	10^3 cyc	1.1	1	0.89	0.18	0.89	1	1.1	0.97	0.82	0.72
						10^8 cyc	0.64	1	1.34	1.17	1.34	1	0.64	0.56	0.48	0.42
#13	BS5400 S/N CURVE: B	10.447	11.651	-4.000	0.182	10^3 cyc	1.24	1.12	1	0.21	1	1.13	1.24	1.09	0.93	0.81
						10^8 cyc	0.48	0.75	1	0.87	1	0.75	0.48	0.42	0.35	0.31
#14	BS5400 S/N CURVE: S	13.205	15.614	-8.000	0.504	10^3 cyc	5.98	5.43	4.82	1	4.83	5.43	5.98	5.26	4.47	3.93
						10^8 cyc	0.54	0.85	1.14	1	1.15	0.85	0.54	0.48	0.41	0.36
#15	DnV S/N CURVE: B	10.449	11.653	-4.000	0.182	10^3 cyc	1.24	1.12	1	0.21	1	1.12	1.24	1.09	0.92	0.81
						10^8 cyc	0.47	0.74	1	0.87	1	0.75	0.47	0.42	0.35	0.31
#16	DnV S/N CURVE: C	9.639	10.692	-3.500	0.204	10^3 cyc	1.1	1	0.89	0.18	0.89	1	1.1	0.97	0.82	0.72
						10^8 cyc	0.64	1	1.34	1.17	1.34	1	0.64	0.56	0.48	0.42
#17	DnV S/N CURVE: D	8.764	9.667	-3.000	0.210	10^3 cyc	1	0.91	0.81	0.17	0.81	0.91	1	0.88	0.75	0.66
						10^8 cyc	1	1.57	2.1	1.84	2.11	1.57	1	0.88	0.75	0.66
#18	DnV S/N CURVE: E	8.597	9.500	-3.000	0.251	10^3 cyc	1.14	1.03	0.92	0.19	0.92	1.03	1.14	1	0.85	0.75
						10^8 cyc	1.14	1.78	2.39	2.09	2.39	1.78	1.14	1	0.85	0.75
#19	DnV S/N CURVE: F	8.383	9.286	-3.000	0.218	10^3 cyc	1.34	1.21	1.08	0.22	1.08	1.22	1.34	1.18	1	0.88
						10^8 cyc	1.34	2.1	2.82	2.46	2.82	2.1	1.34	1.18	1	0.88
#20	DnV S/N CURVE: F2	8.216	9.120	-3.000	0.228	10^3 cyc	1.52	1.38	1.23	0.25	1.23	1.38	1.52	1.34	1.14	1
						10^8 cyc	1.52	2.39	3.2	2.8	3.21	2.39	1.52	1.34	1.14	1
#21	DnV S/N CURVE: G	7.976	8.879	-3.000	0.179	10^3 cyc	1.83	1.66	1.48	0.31	1.48	1.66	1.83	1.61	1.37	1.2
						10^8 cyc	1.83	2.87	3.85	3.37	3.86	2.87	1.83	1.61	1.37	1.2
#22	DnV S/N CURVE: W	7.779	8.682	-3.000	0.185	10^3 cyc	2.13	1.93	1.72	0.36	1.72	1.93	2.13	1.87	1.59	1.4
						10^8 cyc	2.13	3.34	4.48	3.92	4.49	3.34	2.13	1.87	1.59	1.4
#23	DnV S/N CURVE: T	8.746	9.649	-3.000	0.248	10^3 cyc	1.01	0.92	0.82	0.17	0.82	0.92	1.01	0.89	0.76	0.67
						10^8 cyc	1.01	1.59	2.13	1.86	2.14	1.59	1.01	0.89	0.76	0.67
#24	EUROCODE S/N CURVE: 434	9.495	10.398	-3.000	n/a	10^3 cyc	0.57	0.52	0.46	0.1	0.46	0.52	0.57	0.5	0.43	0.37
						10^8 cyc	0.57	0.9	1.2	1.05	1.2	0.9	0.57	0.5	0.43	0.37
#25	EUROCODE S/N CURVE: 380	9.322	10.225	-3.000	n/a	10^3 cyc	0.65	0.59	0.53	0.11	0.53	0.59	0.65	0.57	0.49	0.43
						10^8 cyc	0.65	1.02	1.37	1.2	1.37	1.02	0.65	0.57	0.49	0.43
#26	EUROCODE S/N CURVE: 339	9.173	10.076	-3.000	n/a	10^3 cyc	0.73	0.66	0.59	0.12	0.59	0.66	0.73	0.64	0.55	0.48
						10^8 cyc	0.73	1.15	1.54	1.34	1.54	1.15	0.73	0.64	0.55	0.48
#27	EUROCODE S/N CURVE: 304	9.031	9.934	-3.000	n/a	10^3 cyc	0.81	0.74	0.66	0.14	0.66	0.74	0.81	0.72	0.61	0.53
						10^8 cyc	0.81	1.28	1.71	1.5	1.72	1.28	0.81	0.72	0.61	0.53
#28	EUROCODE S/N CURVE: 271	8.881	9.784	-3.000	n/a	10^3 cyc	0.91	0.83	0.74	0.15	0.74	0.83	0.91	0.8	0.68	0.6
						10^8 cyc	0.91	1.43	1.92	1.68	1.93	1.44	0.91	0.8	0.68	0.6
#29	EUROCODE S/N CURVE: 244	8.744	9.648	-3.000	n/a	10^3 cyc	1.02	0.92	0.82	0.17	0.82	0.92	1.02	0.89	0.76	0.67
						10^8 cyc	1.02	1.59	2.14	1.87	2.14	1.59	1.02	0.89	0.76	0.67
#30	EUROCODE S/N CURVE: 217	8.592	9.495	-3.000	n/a	10^3 cyc	1.14	1.03	0.92	0.19	0.92	1.04	1.14	1	0.85	0.75
						10^8 cyc	1.14	1.79	2.4	2.1	2.4	1.79	1.14	1	0.85	0.75
#31	EUROCODE S/N CURVE: 193	8.439	9.342	-3.000	n/a	10^3 cyc	1.28	1.16	1.03	0.21	1.04	1.16	1.28	1.13	0.96	0.84
						10^8 cyc	1.28	2.01	2.7	2.36	2.7	2.01	1.28	1.13	0.96	0.84
#32	EUROCODE S/N CURVE: 171	8.281	9.184	-3.000	n/a	10^3 cyc	1.45	1.31	1.17	0.24	1.17	1.31	1.45	1.27	1.08	0.95
						10^8 cyc	1.45	2.27	3.05	2.66	3.05	2.27	1.45	1.27	1.08	0.95
#33	EUROCODE S/N CURVE: 152	8.128	9.031	-3.000	n/a	10^3 cyc	1.63	1.48	1.31	0.27	1.31	1.48	1.63	1.43	1.22	1.07
						10^8 cyc	1.63	2.56	3.43	3	3.43	2.56	1.63	1.43	1.22	1.07
#34	EUROCODE S/N CURVE: 136	7.983	8.886	-3.000	n/a	10^3 cyc	1.82	1.65	1.47	0.3	1.47	1.65	1.82	1.6	1.36	1.2
						10^8 cyc	1.82	2.86	3.83	3.35	3.84	2.86	1.82	1.6	1.36	1.2
#35	EUROCODE S/N CURVE: 122	7.841	8.744	-3.000	n/a	10^3 cyc	2.03	1.84	1.64	0.34	1.64	1.84	2.03	1.79	1.52	1.33
						10^8 cyc	2.03	3.19	4.27	3.74	4.28	3.19	2.03	1.79	1.52	1.33
#36	EUROCODE S/N CURVE: 109	7.695	8.598	-3.000	n/a	10^3 cyc	2.27	2.06	1.83	0.38	1.83	2.06	2.27	2	1.7	1.49
						10^8 cyc	2.27	3.56	4.78	4.18	4.78	3.57	2.27	2	1.7	1.49
#37	EUROCODE S/N CURVE: 98	7.556	8.459	-3.000	n/a	10^3 cyc	2.53	2.29	2.04	0.42	2.04	2.29	2.53	2.22	1.89	1.66
						10^8 cyc	2.53	3.97	5.32	4.65	5.32	3.97	2.53	2.22	1.89	1.66
#38	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	0.83	0.76	0.67	0.14	0.67	0.76	0.83	0.73	0.62	0.55
						10^8 cyc	0.83	1.31	1.76	1.53	1.76	1.31	0.83	0.73	0.62	0.55

Code M-2S

	BASELINE CONFIGURATION	LOG(Aamp) (ksi)	LOG(Arng) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #21	#22	#23	#24	#25	#26	#27	#28	#29	#30
#1	AASHTO S/N CURVE: A	9.499	10.402	-3.000	n/a	10^3 cyc	0.31	0.27	0.56	1	0.87	0.78	0.7	0.62	0.56	0.5
						10^8 cyc	0.31	0.27	0.56	1	0.87	0.78	0.7	0.62	0.56	0.5
#2	AASHTO S/N CURVE: B	9.178	10.081	-3.000	n/a	10^3 cyc	0.4	0.34	0.72	1.28	1.12	1	0.89	0.8	0.72	0.64
						10^8 cyc	0.4	0.34	0.72	1.28	1.12	1	0.89	0.8	0.72	0.64
#3	AASHTO S/N CURVE: C	8.750	9.653	-3.000	n/a	10^3 cyc	0.55	0.47	1	1.77	1.55	1.38	1.24	1.11	1	0.89
						10^8 cyc	0.55	0.47	1	1.77	1.55	1.38	1.24	1.11	1	0.89
#4	AASHTO S/N CURVE: D	8.433	9.336	-3.000	n/a	10^3 cyc	0.7	0.61	1.27	2.26	1.98	1.77	1.58	1.41	1.27	1.13
						10^8 cyc	0.7	0.61	1.27	2.26	1.98	1.77	1.58	1.41	1.27	1.13
#5	AASHTO S/N CURVE: E	8.128	9.031	-3.000	n/a	10^3 cyc	0.89	0.77	1.61	2.86	2.5	2.23	2	1.78	1.61	1.43
						10^8 cyc	0.89	0.77	1.61	2.86	2.5	2.23	2	1.78	1.61	1.43
#6	BS5400 S/N CURVE: W	7.782	8.685	-3.000	0.184	10^3 cyc	1.16	1	2.1	3.72	3.26	2.91	2.61	2.32	2.09	1.86
						10^8 cyc	1.16	1	2.1	3.72	3.26	2.91	2.61	2.32	2.09	1.86
#7	BS5400 S/N CURVE: G	7.980	8.883	-3.000	0.179	10^3 cyc	1	0.86	1.8	3.2	2.8	2.5	2.24	2	1.8	1.6
						10^8 cyc	1	0.86	1.8	3.2	2.8	2.5	2.24	2	1.8	1.6
#8	BS5400 S/N CURVE: F2	8.217	9.120	-3.000	0.228	10^3 cyc	0.83	0.71	1.5	2.67	2.34	2.08	1.87	1.66	1.5	1.33
						10^8 cyc	0.83	0.71	1.5	2.67	2.34	2.08	1.87	1.66	1.5	1.33
#9	BS5400 S/N CURVE: F	8.384	9.287	-3.000	0.218	10^3 cyc	0.73	0.63	1.32	2.35	2.05	1.83	1.64	1.46	1.32	1.17
						10^8 cyc	0.73	0.63	1.32	2.35	2.05	1.83	1.64	1.46	1.32	1.17
#10	BS5400 S/N CURVE: E	8.597	9.500	-3.000	0.251	10^3 cyc	0.62	0.53	1.12	1.99	1.74	1.56	1.4	1.24	1.12	1
						10^8 cyc	0.62	0.53	1.12	1.99	1.74	1.56	1.4	1.24	1.12	1
#11	BS5400 S/N CURVE: D	8.764	9.667	-3.000	0.210	10^3 cyc	0.55	0.47	0.99	1.75	1.53	1.37	1.23	1.09	0.98	0.88
						10^8 cyc	0.55	0.47	0.99	1.75	1.53	1.37	1.23	1.09	0.98	0.88
#12	BS5400 S/N CURVE: C	9.638	10.691	-3.500	0.204	10^3 cyc	0.6	0.52	1.09	1.93	1.69	1.51	1.35	1.21	1.09	0.97
						10^8 cyc	0.35	0.3	0.63	1.12	0.98	0.87	0.78	0.7	0.63	0.56
#13	BS5400 S/N CURVE: B	10.447	11.651	-4.000	0.182	10^3 cyc	0.68	0.58	1.22	2.17	1.9	1.7	1.52	1.36	1.22	1.09
						10^8 cyc	0.26	0.22	0.47	0.83	0.73	0.65	0.58	0.52	0.47	0.42
#14	BS5400 S/N CURVE: S	13.205	15.614	-8.000	0.504	10^3 cyc	3.27	2.81	5.9	10.49	9.18	8.19	7.35	6.55	5.89	5.24
						10^8 cyc	0.3	0.26	0.54	0.95	0.83	0.74	0.67	0.59	0.54	0.48
#15	DnV S/N CURVE: B	10.449	11.653	-4.000	0.182	10^3 cyc	0.68	0.58	1.22	2.17	1.9	1.7	1.52	1.36	1.22	1.09
						10^8 cyc	0.26	0.22	0.47	0.83	0.73	0.65	0.58	0.52	0.47	0.42
#16	DnV S/N CURVE: C	9.639	10.692	-3.500	0.204	10^3 cyc	0.6	0.52	1.09	1.93	1.69	1.51	1.35	1.21	1.09	0.97
						10^8 cyc	0.35	0.3	0.63	1.12	0.98	0.87	0.78	0.7	0.63	0.56
#17	DnV S/N CURVE: D	8.764	9.667	-3.000	0.210	10^3 cyc	0.55	0.47	0.99	1.75	1.53	1.37	1.23	1.09	0.98	0.88
						10^8 cyc	0.55	0.47	0.99	1.75	1.53	1.37	1.23	1.09	0.98	0.88
#18	DnV S/N CURVE: E	8.597	9.500	-3.000	0.251	10^3 cyc	0.62	0.53	1.12	1.99	1.74	1.56	1.4	1.24	1.12	1
						10^8 cyc	0.62	0.53	1.12	1.99	1.74	1.56	1.4	1.24	1.12	1
#19	DnV S/N CURVE: F	8.383	9.286	-3.000	0.218	10^3 cyc	0.73	0.63	1.32	2.35	2.06	1.83	1.64	1.47	1.32	1.17
						10^8 cyc	0.73	0.63	1.32	2.35	2.06	1.83	1.64	1.47	1.32	1.17
#20	DnV S/N CURVE: F2	8.216	9.120	-3.000	0.228	10^3 cyc	0.83	0.72	1.5	2.67	2.34	2.08	1.87	1.67	1.5	1.33
						10^8 cyc	0.83	0.72	1.5	2.67	2.34	2.08	1.87	1.67	1.5	1.33
#21	DnV S/N CURVE: G	7.976	8.879	-3.000	0.179	10^3 cyc	1	0.86	1.81	3.21	2.81	2.51	2.25	2	1.8	1.6
						10^8 cyc	1	0.86	1.81	3.21	2.81	2.51	2.25	2	1.8	1.6
#22	DnV S/N CURVE: W	7.779	8.682	-3.000	0.185	10^3 cyc	1.16	1	2.1	3.73	3.27	2.92	2.61	2.33	2.1	1.87
						10^8 cyc	1.16	1	2.1	3.73	3.27	2.92	2.61	2.33	2.1	1.87
#23	DnV S/N CURVE: T	8.746	9.649	-3.000	0.248	10^3 cyc	0.55	0.48	1	1.78	1.56	1.39	1.24	1.11	1	0.89
						10^8 cyc	0.55	0.48	1	1.78	1.56	1.39	1.24	1.11	1	0.89
#24	EUROCODE S/N CURVE: 434	9.495	10.398	-3.000	n/a	10^3 cyc	0.31	0.27	0.56	1	0.88	0.78	0.7	0.62	0.56	0.5
						10^8 cyc	0.31	0.27	0.56	1	0.88	0.78	0.7	0.62	0.56	0.5
#25	EUROCODE S/N CURVE: 380	9.322	10.225	-3.000	n/a	10^3 cyc	0.36	0.31	0.64	1.14	1	0.89	0.8	0.71	0.64	0.57
						10^8 cyc	0.36	0.31	0.64	1.14	1	0.89	0.8	0.71	0.64	0.57
#26	EUROCODE S/N CURVE: 339	9.173	10.076	-3.000	n/a	10^3 cyc	0.4	0.34	0.72	1.28	1.12	1	0.9	0.8	0.72	0.64
						10^8 cyc	0.4	0.34	0.72	1.28	1.12	1	0.9	0.8	0.72	0.64
#27	EUROCODE S/N CURVE: 304	9.031	9.934	-3.000	n/a	10^3 cyc	0.44	0.38	0.8	1.43	1.25	1.12	1	0.89	0.8	0.71
						10^8 cyc	0.44	0.38	0.8	1.43	1.25	1.12	1	0.89	0.8	0.71
#28	EUROCODE S/N CURVE: 271	8.881	9.784	-3.000	n/a	10^3 cyc	0.5	0.43	0.9	1.6	1.4	1.25	1.12	1	0.9	0.8
						10^8 cyc	0.5	0.43	0.9	1.6	1.4	1.25	1.12	1	0.9	0.8
#29	EUROCODE S/N CURVE: 244	8.744	9.648	-3.000	n/a	10^3 cyc	0.55	0.48	1	1.78	1.56	1.39	1.25	1.11	1	0.89
						10^8 cyc	0.55	0.48	1	1.78	1.56	1.39	1.25	1.11	1	0.89
#30	EUROCODE S/N CURVE: 217	8.592	9.495	-3.000	n/a	10^3 cyc	0.62	0.54	1.13	2	1.75	1.56	1.4	1.25	1.12	1
						10^8 cyc	0.62	0.54	1.13	2	1.75	1.56	1.4	1.25	1.12	1
#31	EUROCODE S/N CURVE: 193	8.439	9.342	-3.000	n/a	10^3 cyc	0.7	0.6	1.27	2.25	1.97	1.76	1.58	1.4	1.26	1.12
						10^8 cyc	0.7	0.6	1.27	2.25	1.97	1.76	1.58	1.4	1.26	1.12
#32	EUROCODE S/N CURVE: 171	8.281	9.184	-3.000	n/a	10^3 cyc	0.79	0.68	1.43	2.54	2.22	1.98	1.78	1.58	1.43	1.27
						10^8 cyc	0.79	0.68	1.43	2.54	2.22	1.98	1.78	1.58	1.43	1.27
#33	EUROCODE S/N CURVE: 152	8.128	9.031	-3.000	n/a	10^3 cyc	0.89	0.77	1.61	2.86	2.5	2.23	2	1.78	1.6	1.43
						10^8 cyc	0.89	0.77	1.61	2.86	2.5	2.23	2	1.78	1.6	1.43
#34	EUROCODE S/N CURVE: 136	7.983	8.886	-3.000	n/a	10^3 cyc	0.99	0.86	1.8	3.19	2.79	2.49	2.24	1.99	1.79	1.6
						10^8 cyc	0.99	0.86	1.8	3.19	2.79	2.49	2.24	1.99	1.79	1.6
#35	EUROCODE S/N CURVE: 122	7.841	8.744	-3.000	n/a	10^3 cyc	1.11	0.95	2	3.56	3.12	2.78	2.49	2.22	2	1.78
						10^8 cyc	1.11	0.95	2	3.56	3.12	2.78	2.49	2.22	2	1.78
#36	EUROCODE S/N CURVE: 109	7.695	8.598	-3.000	n/a	10^3 cyc	1.24	1.07	2.24	3.98	3.49	3.11	2.79	2.49	2.24	1.99
						10^8 cyc	1.24	1.07	2.24	3.98	3.49	3.11	2.79	2.49	2.24	1.99
#37	EUROCODE S/N CURVE: 96	7.556	8.459	-3.000	n/a	10^3 cyc	1.38	1.19	2.49	4.43	3.88	3.46	3.1	2.76	2.49	2.21
						10^8 cyc	1.38	1.19	2.49	4.43	3.88	3.46	3.1	2.76	2.49	2.21
#38	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	0.46	0.39	0.82	1.46	1.28	1.14	1.02	0.91	0.82	0.73
						10^8 cyc	0.46	0.39	0.82	1.46	1.28	1.14	1.02	0.91	0.82	0.73

	BASELINE CONFIGURATION	LOG(Aamp (ksi)	LOG(Amg) (ksi)	B	STD DEV	RATIO @	RMS FATIGUE STRENGTH RATIO (MEAN-2S; 2.3% PROBABILITY OF FAILURE) #31	#32	#33	#34	#35	#36	#37	#38
#1	AASHTO S/N CURVE: A	9.499	10.402	-3.000	n/a	10^3 cyc	0.44	0.39	0.35	0.31	0.28	0.25	0.23	0.68
						10^8 cyc	0.44	0.39	0.35	0.31	0.28	0.25	0.23	0.68
#2	AASHTO S/N CURVE: B	9.178	10.081	-3.000	n/a	10^3 cyc	0.57	0.5	0.45	0.4	0.36	0.32	0.29	0.87
						10^8 cyc	0.57	0.5	0.45	0.4	0.36	0.32	0.29	0.87
#3	AASHTO S/N CURVE: C	8.750	9.653	-3.000	n/a	10^3 cyc	0.79	0.7	0.62	0.56	0.5	0.45	0.4	1.21
						10^8 cyc	0.79	0.7	0.62	0.56	0.5	0.45	0.4	1.21
#4	AASHTO S/N CURVE: D	8.433	9.336	-3.000	n/a	10^3 cyc	1.01	0.89	0.79	0.71	0.64	0.57	0.51	1.55
						10^8 cyc	1.01	0.89	0.79	0.71	0.64	0.57	0.51	1.55
#5	AASHTO S/N CURVE: E	8.128	9.031	-3.000	n/a	10^3 cyc	1.27	1.13	1	0.9	0.8	0.72	0.65	1.95
						10^8 cyc	1.27	1.13	1	0.9	0.8	0.72	0.65	1.95
#6	BS5400 S/N CURVE: W	7.782	8.685	-3.000	0.184	10^3 cyc	1.66	1.47	1.3	1.17	1.05	0.94	0.84	2.55
						10^8 cyc	1.66	1.47	1.3	1.17	1.05	0.94	0.84	2.55
#7	BS5400 S/N CURVE: G	7.980	8.883	-3.000	0.179	10^3 cyc	1.42	1.26	1.12	1	0.9	0.8	0.72	2.19
						10^8 cyc	1.42	1.26	1.12	1	0.9	0.8	0.72	2.19
#8	BS5400 S/N CURVE: F2	8.217	9.120	-3.000	0.228	10^3 cyc	1.19	1.05	0.93	0.84	0.75	0.67	0.6	1.82
						10^8 cyc	1.19	1.05	0.93	0.84	0.75	0.67	0.6	1.82
#9	BS5400 S/N CURVE: F	8.384	9.287	-3.000	0.218	10^3 cyc	1.04	0.92	0.82	0.74	0.66	0.59	0.53	1.6
						10^8 cyc	1.04	0.92	0.82	0.74	0.66	0.59	0.53	1.6
#10	BS5400 S/N CURVE: E	8.597	9.500	-3.000	0.251	10^3 cyc	0.89	0.78	0.7	0.62	0.56	0.5	0.45	1.36
						10^8 cyc	0.89	0.78	0.7	0.62	0.56	0.5	0.45	1.36
#11	BS5400 S/N CURVE: D	8.764	9.667	-3.000	0.210	10^3 cyc	0.78	0.69	0.61	0.55	0.49	0.44	0.4	1.2
						10^8 cyc	0.78	0.69	0.61	0.55	0.49	0.44	0.4	1.2
#12	BS5400 S/N CURVE: C	9.638	10.691	-3.500	0.204	10^3 cyc	0.86	0.76	0.68	0.61	0.54	0.49	0.44	1.32
						10^8 cyc	0.5	0.44	0.39	0.35	0.31	0.28	0.25	0.76
#13	BS5400 S/N CURVE: B	10.447	11.651	-4.000	0.182	10^3 cyc	0.97	0.86	0.76	0.68	0.61	0.55	0.49	1.49
						10^8 cyc	0.37	0.33	0.29	0.26	0.23	0.21	0.19	0.57
#14	BS5400 S/N CURVE: S	13.205	15.614	-8.000	0.504	10^3 cyc	4.66	4.13	3.67	3.29	2.95	2.63	2.37	7.17
						10^8 cyc	0.42	0.38	0.33	0.3	0.27	0.24	0.22	0.65
#15	DnV S/N CURVE: B	10.449	11.653	-4.000	0.182	10^3 cyc	0.97	0.86	0.76	0.68	0.61	0.55	0.49	1.49
						10^8 cyc	0.37	0.33	0.29	0.26	0.23	0.21	0.19	0.57
#16	DnV S/N CURVE: C	9.639	10.692	-3.500	0.204	10^3 cyc	0.86	0.76	0.68	0.61	0.54	0.49	0.44	1.32
						10^8 cyc	0.5	0.44	0.39	0.35	0.31	0.28	0.25	0.76
#17	DnV S/N CURVE: D	8.764	9.667	-3.000	0.210	10^3 cyc	0.78	0.69	0.61	0.55	0.49	0.44	0.4	1.2
						10^8 cyc	0.78	0.69	0.61	0.55	0.49	0.44	0.4	1.2
#18	DnV S/N CURVE: E	8.597	9.500	-3.000	0.251	10^3 cyc	0.89	0.78	0.7	0.62	0.56	0.5	0.45	1.36
						10^8 cyc	0.89	0.78	0.7	0.62	0.56	0.5	0.45	1.36
#19	DnV S/N CURVE: F	8.383	9.286	-3.000	0.218	10^3 cyc	1.04	0.92	0.82	0.74	0.66	0.59	0.53	1.61
						10^8 cyc	1.04	0.92	0.82	0.74	0.66	0.59	0.53	1.61
#20	DnV S/N CURVE: F2	8.216	9.120	-3.000	0.228	10^3 cyc	1.19	1.05	0.93	0.84	0.75	0.67	0.6	1.83
						10^8 cyc	1.19	1.05	0.93	0.84	0.75	0.67	0.6	1.83
#21	DnV S/N CURVE: G	7.976	8.879	-3.000	0.179	10^3 cyc	1.43	1.26	1.12	1.01	0.9	0.81	0.72	2.19
						10^8 cyc	1.43	1.26	1.12	1.01	0.9	0.81	0.72	2.19
#22	DnV S/N CURVE: W	7.779	8.682	-3.000	0.185	10^3 cyc	1.66	1.47	1.31	1.17	1.05	0.94	0.84	2.55
						10^8 cyc	1.66	1.47	1.31	1.17	1.05	0.94	0.84	2.55
#23	DnV S/N CURVE: T	8.746	9.649	-3.000	0.248	10^3 cyc	0.79	0.7	0.62	0.56	0.5	0.45	0.4	1.22
						10^8 cyc	0.79	0.7	0.62	0.56	0.5	0.45	0.4	1.22
#24	EUROCODE S/N CURVE: 434	9.495	10.398	-3.000	n/a	10^3 cyc	0.44	0.39	0.35	0.31	0.28	0.25	0.23	0.68
						10^8 cyc	0.44	0.39	0.35	0.31	0.28	0.25	0.23	0.68
#25	EUROCODE S/N CURVE: 380	9.322	10.225	-3.000	n/a	10^3 cyc	0.51	0.45	0.4	0.36	0.32	0.29	0.26	0.78
						10^8 cyc	0.51	0.45	0.4	0.36	0.32	0.29	0.26	0.78
#26	EUROCODE S/N CURVE: 339	9.173	10.076	-3.000	n/a	10^3 cyc	0.57	0.5	0.45	0.4	0.36	0.32	0.29	0.88
						10^8 cyc	0.57	0.5	0.45	0.4	0.36	0.32	0.29	0.88
#27	EUROCODE S/N CURVE: 304	9.031	9.934	-3.000	n/a	10^3 cyc	0.63	0.56	0.5	0.45	0.4	0.36	0.32	0.98
						10^8 cyc	0.63	0.56	0.5	0.45	0.4	0.36	0.32	0.98
#28	EUROCODE S/N CURVE: 271	8.881	9.784	-3.000	n/a	10^3 cyc	0.71	0.63	0.56	0.5	0.45	0.4	0.36	1.1
						10^8 cyc	0.71	0.63	0.56	0.5	0.45	0.4	0.36	1.1
#29	EUROCODE S/N CURVE: 244	8.744	9.648	-3.000	n/a	10^3 cyc	0.79	0.7	0.62	0.56	0.5	0.45	0.4	1.22
						10^8 cyc	0.79	0.7	0.62	0.56	0.5	0.45	0.4	1.22
#30	EUROCODE S/N CURVE: 217	8.592	9.495	-3.000	n/a	10^3 cyc	0.89	0.79	0.7	0.63	0.56	0.5	0.45	1.37
						10^8 cyc	0.89	0.79	0.7	0.63	0.56	0.5	0.45	1.37
#31	EUROCODE S/N CURVE: 193	8.439	9.342	-3.000	n/a	10^3 cyc	1	0.89	0.79	0.7	0.63	0.56	0.51	1.54
						10^8 cyc	1	0.89	0.79	0.7	0.63	0.56	0.51	1.54
#32	EUROCODE S/N CURVE: 171	8.281	9.184	-3.000	n/a	10^3 cyc	1.13	1	0.89	0.8	0.71	0.64	0.57	1.74
						10^8 cyc	1.13	1	0.89	0.8	0.71	0.64	0.57	1.74
#33	EUROCODE S/N CURVE: 152	8.128	9.031	-3.000	n/a	10^3 cyc	1.27	1.12	1	0.89	0.8	0.72	0.64	1.95
						10^8 cyc	1.27	1.12	1	0.89	0.8	0.72	0.64	1.95
#34	EUROCODE S/N CURVE: 136	7.983	8.886	-3.000	n/a	10^3 cyc	1.42	1.26	1.12	1	0.9	0.8	0.72	2.18
						10^8 cyc	1.42	1.26	1.12	1	0.9	0.8	0.72	2.18
#35	EUROCODE S/N CURVE: 122	7.841	8.744	-3.000	n/a	10^3 cyc	1.58	1.4	1.25	1.12	1	0.89	0.8	2.43
						10^8 cyc	1.58	1.4	1.25	1.12	1	0.89	0.8	2.43
#36	EUROCODE S/N CURVE: 109	7.695	8.598	-3.000	n/a	10^3 cyc	1.77	1.57	1.39	1.25	1.12	1	0.9	2.72
						10^8 cyc	1.77	1.57	1.39	1.25	1.12	1	0.9	2.72
#37	EUROCODE S/N CURVE: 98	7.556	8.459	-3.000	n/a	10^3 cyc	1.97	1.74	1.55	1.39	1.24	1.11	1	3.03
						10^8 cyc	1.97	1.74	1.55	1.39	1.24	1.11	1	3.03
#38	Generic S/N Curve	9.000	9.903	-3.000	0.000	10^3 cyc	0.65	0.58	0.51	0.46	0.41	0.37	0.33	1
						10^8 cyc	0.65	0.58	0.51	0.46	0.41	0.37	0.33	1

Appendix J

Ranking of Fatigue Strength Ratios

Ranking of Fatigue Strength Ratios

The fatigue strength ratios determined in Appendix I are useful to compare one given detail strength against another, whether the strength parameters originated from test data or design codes. However, it is sometimes useful to compare strengths of details to determine how they fit within details defined by a family of S/N curves typically contained in design codes. To accommodate this need, specific strength ratios were taken from the previous appendix and sorted to produce a ranking of fatigue strength ratios from weakest to strongest.

The relative ranking of the experimental and design code fatigue strengths was performed using the tables of RMS strength ratios associated first with a 50% (mean) probability of failure, and then with a 2.3% (mean minus two sigma) probability of failure. At each probability of failure, relative fatigue strengths were considered in the low cycle regime (10^3 cycles) and in the high cycle regime (10^8 cycles). The fatigue strengths used in the rankings were established by using the appropriate S/N curve coefficients of the experimental or design code detail, substituting the coefficients into the Rayleigh Approximation formula, and determining the RMS stress associated with the desired cycle count. Fatigue strength ratios were then calculated using the generic S/N curve parameters as the baseline.

The results of these rankings are contained in this appendix are organized in the following manner. Tables J-1, J-2 and J-3 contain the mean (50% probability of failure) strength ratios unsorted, sorted at 10^3 cycles and sorted at 10^8 cycles, respectively. Similarly, Tables J-4, J-5 and J-6 contain the mean minus two sigma (2.3% probability of

failure) strength ratios unsorted, sorted at 10^3 cycles and sorted at 10^8 cycles, respectively.

As a specific application example of this information the body of test data provided in Appendix E is compared with the AASHTO design curve categories using the strength ratios corresponding to the four different combinations of cycle count (10^3 or 10^8) and probability of failure (50% and 2.3%). Results of this comparison are provided in Table J-7. Table J-8 provides a slightly different perspective, categorizing the NSWCCD details by description rather than purely analytical ranking. Although the general trends are evident with the more severe details falling into the lower categories, there is not a consistent match in every case. There are many reasons for such disparity, including differences in specimen size and thickness (AASHTO based on large thick bridge girder type specimens and the NSWCCD data based on relatively smaller and thinner specimens), the fact that the AASHTO S/N curves are forced to have a slope of –3.0, as well as effects of material, quality and fabrication procedure. Such items should be kept in mind when comparing any fatigue data or S/N curves.

As a final, but cursory comparison, NSWCCD test data from Appendix E are plotted over each family of the design code (mean minus two sigma) S/N curves, as shown in Figures J-1 through J-4. Although no attempt has been made to identify each individual data point with a specimen configuration, the test data has been segregated into "valid" data points (actual failures used to calculate S/N curves) and data points that exist, but were not used in analyses (runouts and specimen failures contained within stress levels which also contain runouts). Since the design code S/N curves represent 2.3% probability of failure, test data falling above a particular curve could be represented

by that curve. From these plots, the most severe S/N curve from any of the design codes can be identified that encompasses all the NSWCCD data. For example, it can be seen that most of the data (regardless of actual configuration) can be represented by an AASHTO category E detail, and that all the test data (regardless of configuration) can be represented by a category E' detail. Category E details include welded steel configurations that contain load-carrying attachments, weld terminations and interruptions, misalignments and weld defects. Category E' details contain slightly more severe attributes of Category E configurations.

Data Index

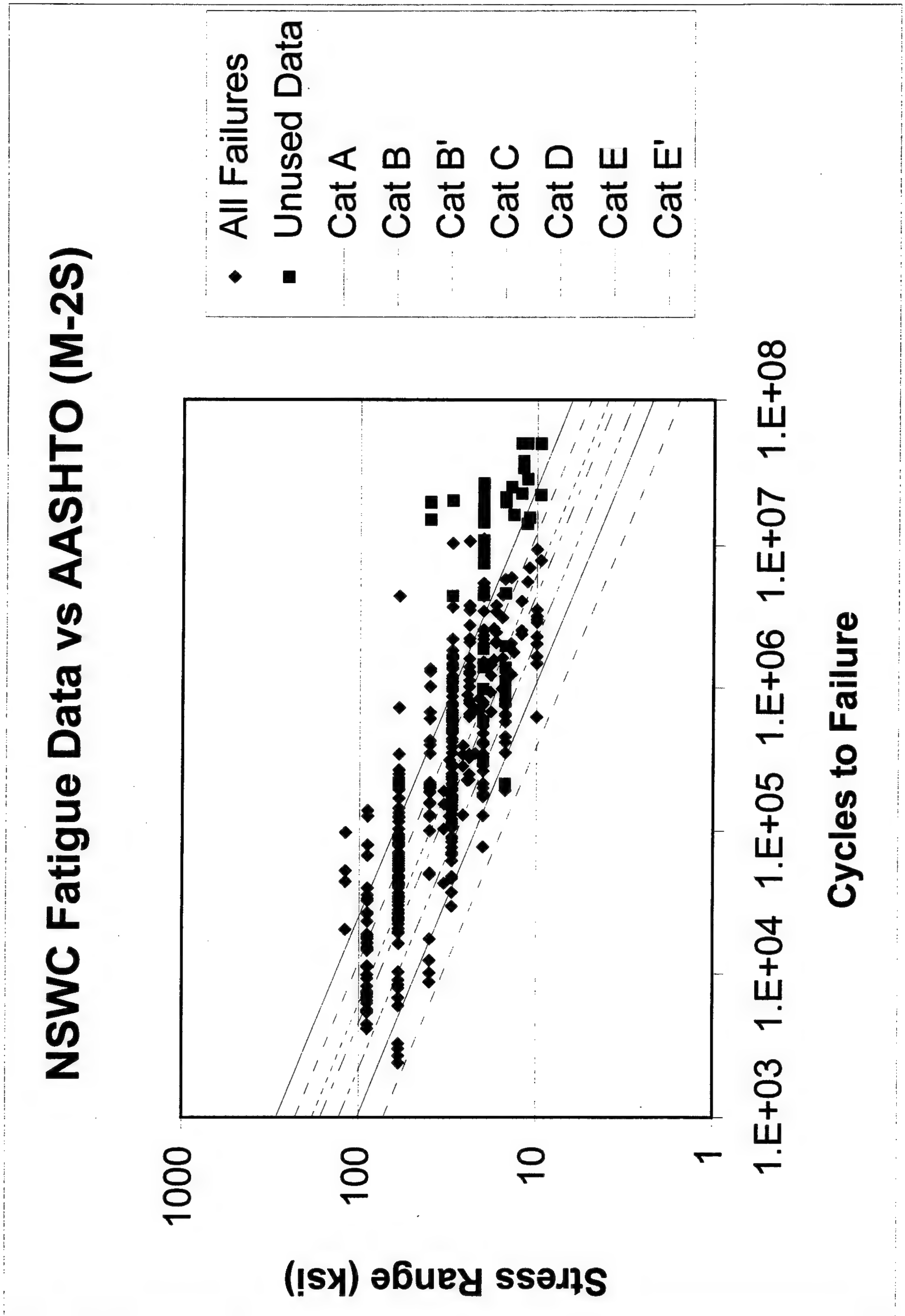


Figure J-1 - NSWC Fatigue Data vs AASHTO (m-2s)

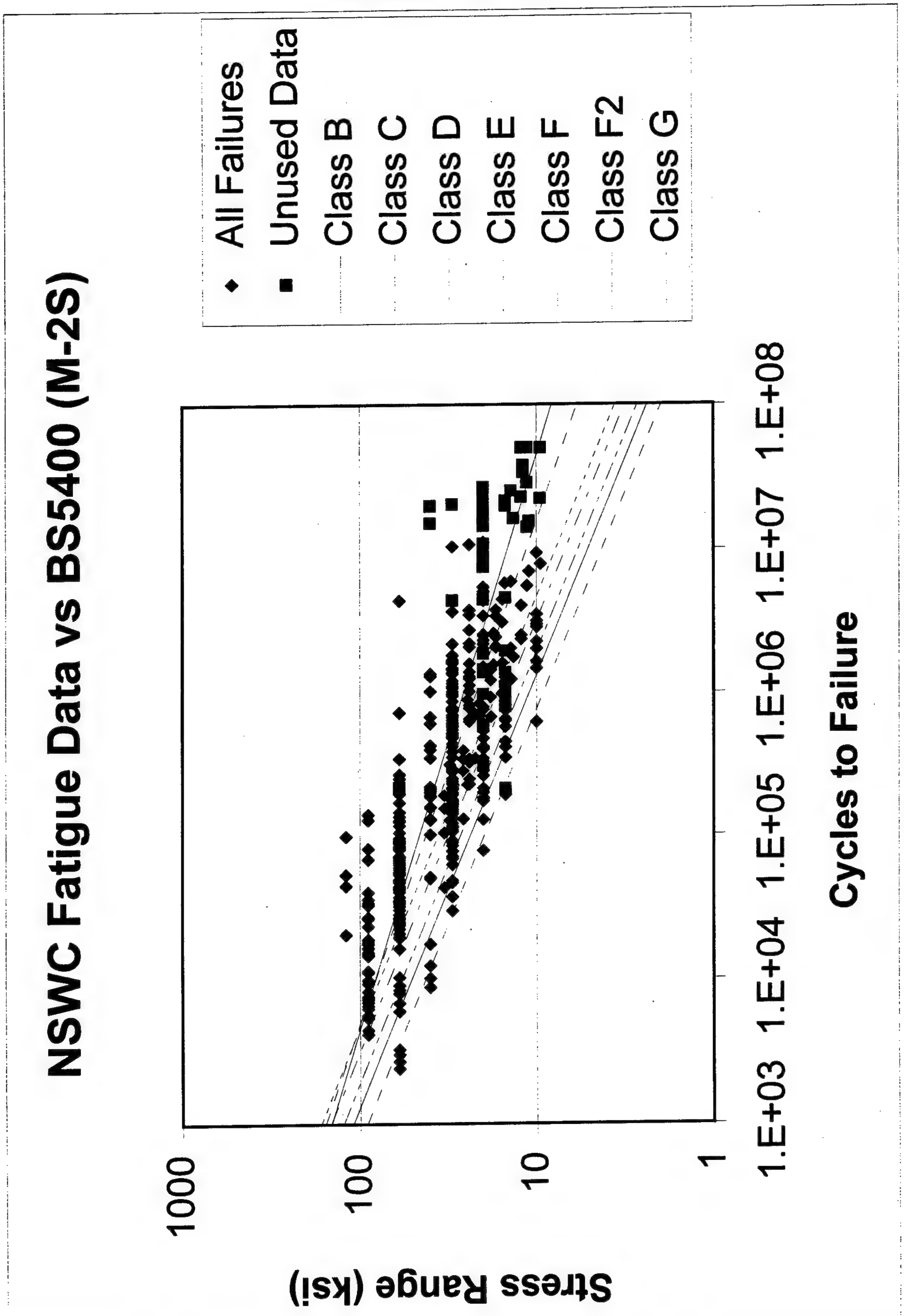


Figure J-2 - NSWC Fatigue Data vs BS5400 (m-2s)

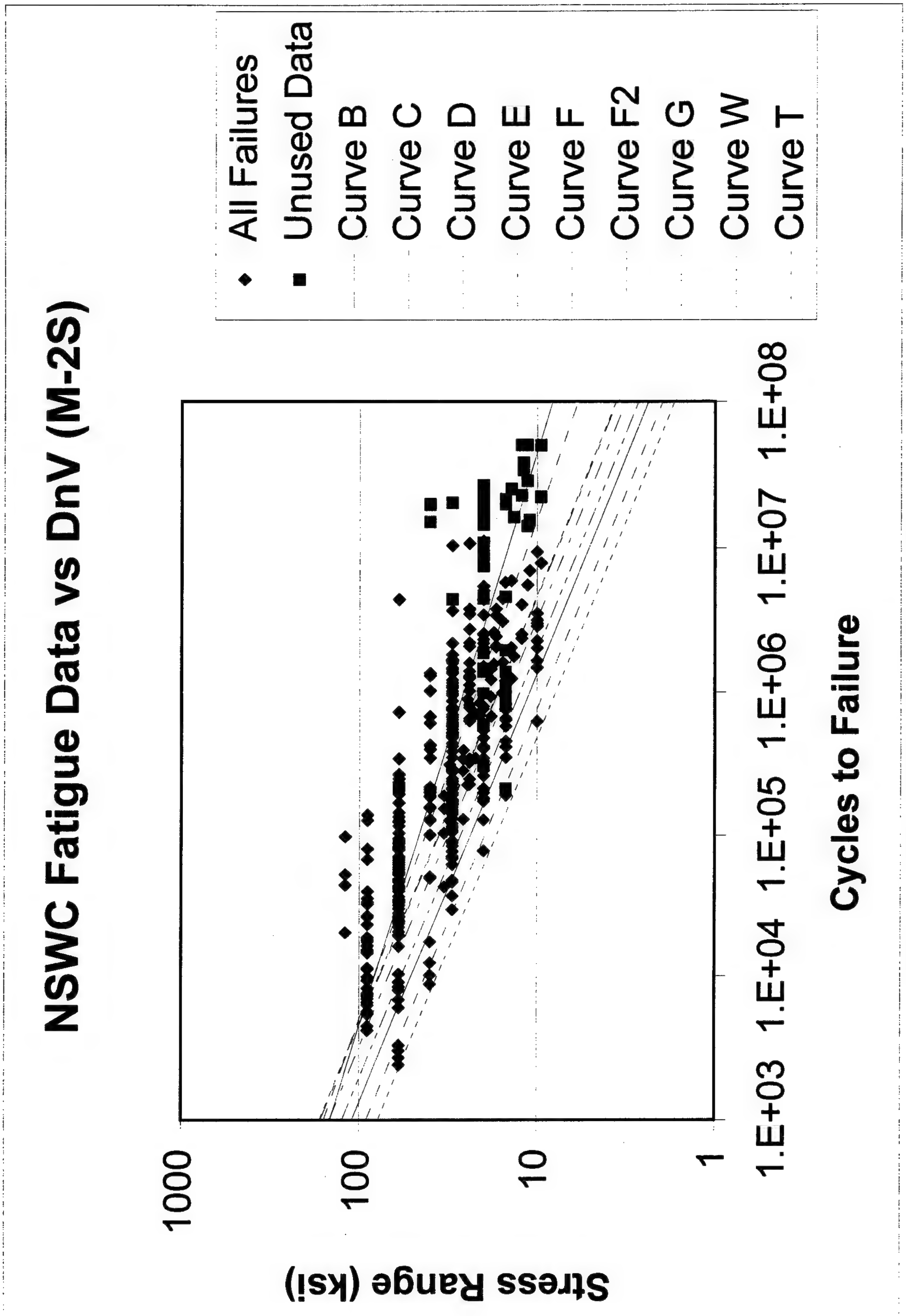


Figure J-3 - NSWC Fatigue Data vs DnV (m-2s)

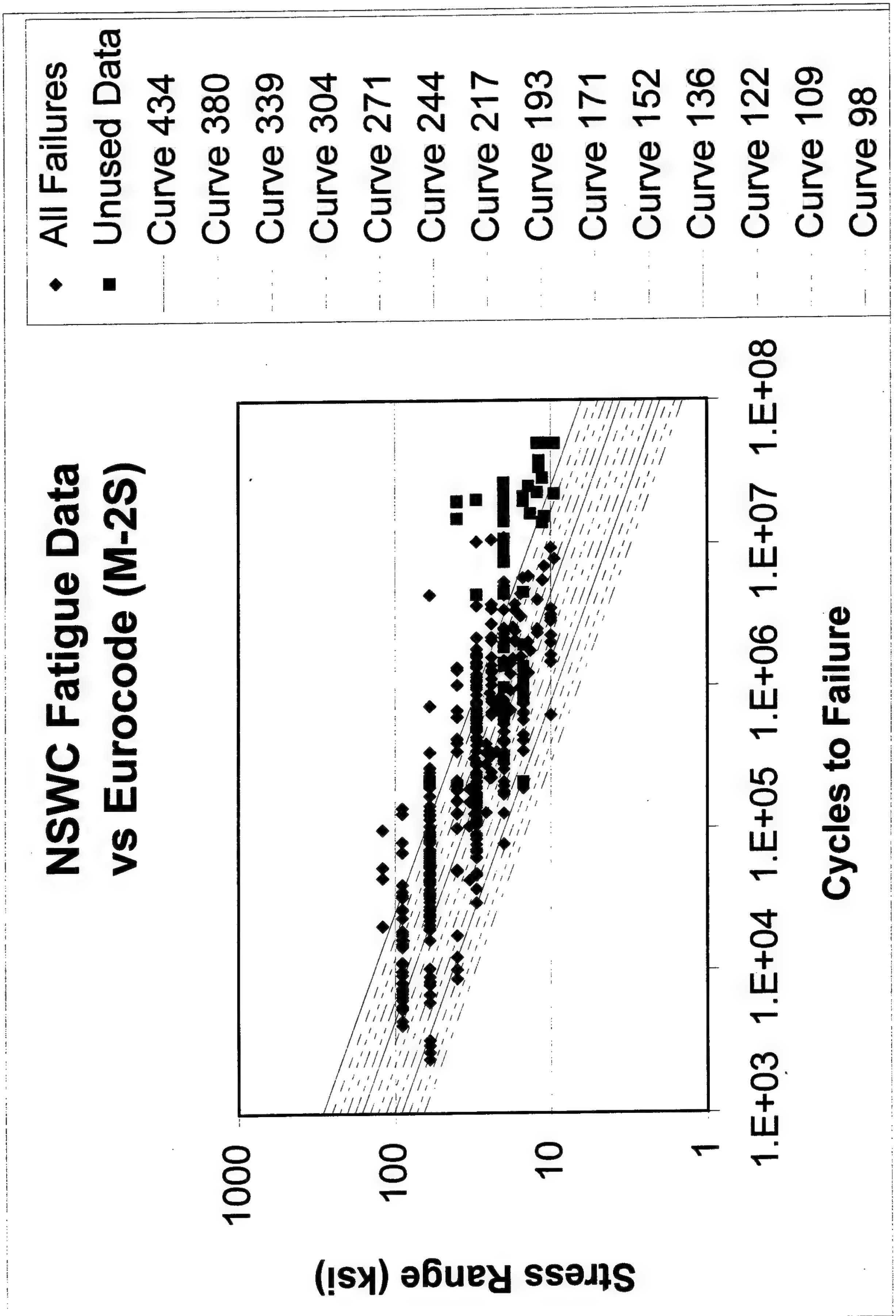


Figure J-4 - NSWC Fatigue Data vs Eurocode (m-2s)

Table J-1 – Mean Strength Ratios Unsorted

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Arng)	B	STD DEV	10^3 cyc	10^8 cyc
NSWC #1	HSLA 7/16" bending, shipyard	Full penetration non-load carrying welds	13.617	15.161	-5.130	0.378	1.01	4.95
NSWC #2	HSLA 1/4", continuous cruc., shipyard	Full penetration non-load carrying welds	10.714	11.944	-4.087	0.350	0.71	1.97
NSWC #3	HSLA 7/16", continuous cruciform	Full penetration non-load carrying welds	9.559	10.525	-3.210	0.185	1.09	1.4
NSWC #4	HSLA 7/16", continuous cruc., shipyard	Full penetration non-load carrying welds	10.432	11.592	-3.855	0.210	0.79	1.85
NSWC #5	HSLA 7/16", continuous cruc., lab & syd	Full penetration non-load carrying welds	9.947	10.999	-3.496	0.205	0.93	1.61
NSWC #6	HSLA 3/4", continuous cruc., shipyard	Full penetration non-load carrying welds	9.057	10.000	-3.134	0.172	0.85	1
NSWC #7	HSLA 1", continuous cruc., shipyard	Full penetration non-load carrying welds	8.389	9.211	-2.732	0.068	0.96	0.66
NSWC #8	HSLA discontinuous cruciform	Full penetration load carrying welds	9.601	10.597	-3.307	0.263	0.97	1.38
NSWC #9	HSLA misaligned cruciform	Half thickness misalignment, full penetration	9.733	10.922	-3.949	0.227	0.47	1.18
NSWC #10	HSLA non-full penetration disc cruciform	Partial penetration load carrying welds	8.272	9.081	-2.686	0.139	0.94	0.6
NSWC #11	HSLA misaligned partial penetration welds	Half thickness misalignment, partial penetration	8.513	9.521	-3.349	0.208	0.43	0.64
NSWC #12	HS continuous cruciform	Full penetration non-load carrying welds	11.289	12.639	-4.486	0.218	0.63	2.24
NSWC #13	HS discontinuous cruciform	Full penetration load carrying welds	9.648	10.677	-3.417	0.252	0.85	1.36
NSWC #14	HS misaligned cruciform	Half thickness misalignment, full penetration	12.902	14.833	-6.416	0.142	0.28	2.15
NSWC #15	OS continuous cruciform	Full penetration non-load carrying welds	10.566	11.766	-3.987	0.221	0.73	1.89
NSWC #16	OS discontinuous cruciform	Full penetration load carrying welds	10.185	11.314	-3.752	0.304	0.77	1.67
NSWC #17	OS misaligned cruciform	Half thickness misalignment, full penetration	10.541	12.023	-4.924	0.149	0.3	1.32
NSWC #18	HSLA & HS conventional components	Continuous bulkhead penetration, R=0	9.192	10.174	-3.263	0.214	0.77	1.05
NSWC #19	HSLA SNIPED COMP	Cont. bhd penetration with sniped bhd stiffener, R=0	10.058	11.267	-4.016	0.139	0.53	1.39
NSWC #20	HSLA INTERCOASTAL	Discontinuous bulkhead penetration, R=0	9.699	10.930	-4.088	0.120	0.4	1.11
NSWC #21	HSLA CONV CMP R=-1	Continuous bulkhead penetration	9.427	10.399	-3.230	0.169	0.96	1.26
NSWC #22	HSLA Stiffener Splice	Stiffener transition detail	10.843	12.122	-4.250	0.177	0.64	1.97
NSWC #23	HSLA Opening Detail	Reinforced opening detail	8.923	9.971	-3.480	0.203	0.48	0.82
NSWC #24	HSLA Flame cut edge	Flame cut edge	10.553	11.668	-3.705	0.092	1.03	2.14
NSWC #25	HSLA Insert Plate "Good Weld"	Half thickness insert plate	12.101	13.633	-5.090	0.184	0.53	2.55
NSWC #26	HSLA Insert Plate "Poor Weld"	Lack of fusion defects in weld	9.845	11.051	-4.009	0.103	0.47	1.24
NSWC #27	HSLA one sided welds	Permanent backing bar, one sided weld	9.956	10.949	-3.298	0.307	1.25	1.77
NSWC #28	HSLA single thickness doubler welds	Doubler plate, same thickness doubler	9.179	10.119	-3.122	0.490	0.94	1.1
NSWC #29	HSLA double thickness doubler welds	Doubler plate, twice thickness doubler	8.843	9.680	-2.780	0.555	1.29	0.95
AASHTO #1	AASHTO S/N CURVE: A	Baseplate dressed edges	9.940	10.843	-3.000	0.221	2.06	2.06
AASHTO #2	AASHTO S/N CURVE: B	Continuous Longitudinal Welds	9.471	10.374	-3.000	0.147	1.44	1.44
AASHTO #3	AASHTO S/N CURVE: C	Transverse NDE full penetration butt welds	8.875	9.778	-3.000	0.063	0.91	0.91
AASHTO #4	AASHTO S/N CURVE: D	Non-NDE full penetration butt welds, attachments	8.648	9.551	-3.000	0.108	0.76	0.76
AASHTO #5	AASHTO S/N CURVE: E	Weld terminations and overlaps	8.329	9.232	-3.000	0.101	0.6	0.6
BS5400 #1	BS5400 S/N CURVE: W	Weld throat based stresses	8.150	9.054	-3.000	0.184	0.52	0.52
BS5400 #2	BS5400 S/N CURVE: G	Flange attachments close to edge, undercut	8.338	9.241	-3.000	0.179	0.6	0.6
BS5400 #3	BS5400 S/N CURVE: F2	Transverse fillet welds at high SCF areas	8.672	9.575	-3.000	0.228	0.78	0.78
BS5400 #4	BS5400 S/N CURVE: F	Backing strip welds & flange attachments	8.820	9.723	-3.000	0.218	0.87	0.87
BS5400 #5	BS5400 S/N CURVE: E	Butts in unequal thickness & width, web brackets	9.099	10.003	-3.000	0.251	1.08	1.08
BS5400 #6	BS5400 S/N CURVE: D	Transverse butt welds and start/stop in long	9.183	10.086	-3.000	0.210	1.15	1.15
BS5400 #7	BS5400 S/N CURVE: C	Flame-cut edges and longitudinal welds	10.046	11.100	-3.500	0.204	0.99	1.71
BS5400 #8	BS5400 S/N CURVE: B	Parent plate, as welded	10.812	12.016	-4.000	0.182	0.83	2.17
BS5400 #9	BS5400 S/N CURVE: S	Shear connectors in concrete	14.214	16.623	-8.000	0.504	0.19	2.05
DNV #1	DnV S/N CURVE: B	base plate or dressed welds	10.813	12.017	-4.000	0.182	0.83	2.17
DNV #2	DnV S/N CURVE: C	Flame cut edge or cont. butt & fillet welds	10.047	11.100	-3.500	0.204	0.99	1.71

Table J-1 – Mean Strength Ratios Unsorted (cont.)

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Amg)	B	STD DEV	10^3 cyc	10^8 cyc
DNV #3	DnV S/N CURVE: D	Butt & fillet welds with start/stop positions	9.183	10.086	-3.000	0.210	1.15	1.15
DNV #4	DnV S/N CURVE: E	Butts in unequal thickness & width, dressed welds	9.099	10.002	-3.000	0.251	1.08	1.08
DNV #5	DnV S/N CURVE: F	Backing strip welds & short flange attachments	8.819	9.722	-3.000	0.218	0.87	0.87
DNV #6	DnV S/N CURVE: F2	Butts in unequal width plates, long attachments	8.672	9.575	-3.000	0.228	0.78	0.78
DNV #7	DnV S/N CURVE: G	Flange attachments close to edge, undercut	8.335	9.238	-3.000	0.179	0.6	0.6
DNV #8	DnV S/N CURVE: W	Partial penetration load carrying welds	8.148	9.052	-3.000	0.185	0.52	0.52
DNV #9	DnV S/N CURVE: T	Tubular joints	9.243	10.146	-3.000	0.248	1.21	1.21
SSC #1	SSC:1(all steels)	Baseplate	13.825	15.550	-5.729	0.750	0.64	3.99
SSC #2	SSC:1M	Baseplate Mild Steel	21.679	25.360	-12.229	0.710	0.21	3.85
SSC #3	SSC:1H	Baseplate HSLA Steel	27.389	32.040	-15.449	0.910	0.22	4.8
SSC #4	SSC:1Q	Baseplate Q & T Steel	13.345	14.910	-5.199	0.680	0.83	4.23
SSC #5	SSC:1(F)	Baseplate Flame Cut	12.334	13.780	-4.805	0.600	0.77	3.24
SSC #6	SSC:2	Rolled I-Beam Bending	13.999	15.820	-6.048	0.640	0.54	3.71
SSC #7	SSC:3	Longitudinal Seam	13.010	14.800	-5.946	0.630	0.39	2.64
SSC #8	SSC:3(G)	Ground Long. Seam	13.602	15.520	-6.370	0.740	0.37	2.81
SSC #9	SSC:4	Long. Fillet Weld Bndg	12.515	14.220	-5.663	0.610	0.4	2.42
SSC #10	SSC:5	Cvr Plt on I-Bm Flg Bndg	8.663	9.650	-3.278	0.480	0.52	0.72
SSC #11	SSC:6	Dbl I-Bm Bndg	12.515	14.220	-5.663	0.610	0.4	2.42
SSC #12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	10.095	11.230	-3.771	0.530	0.72	1.57
SSC #13	SSC:7P	I-Bm w/vrt Web St Prin Stress	10.204	11.460	-4.172	0.510	0.49	1.43
SSC #14	SSC:8	Bolted Double Lap	14.469	16.440	-6.549	0.810	0.45	3.58
SSC #15	SSC:9	Riveted Single Lap	16.687	19.590	-9.643	0.900	0.18	2.55
SSC #16	SSC:10M	Butt Weld Axial:Mild Steel	14.345	16.630	-7.589	0.880	0.24	2.4
SSC #17	SSC:10H	Butt Weld Axial:HSLA Steel	22.068	25.920	-12.795	0.960	0.19	3.62
SSC #18	SSC:10Q	Butt Weld Axial:Q&T Steel	12.108	13.650	-5.124	0.760	0.51	2.52
SSC #19	SSC:10(G)	Butt Weld Axial:Ground	14.784	16.930	-7.130	0.940	0.35	3.19
SSC #20	SSC:10A	Butt Weld Bndg	12.494	14.140	-5.468	0.790	0.46	2.59
SSC #21	SSC:11	I-Bm Butt Weld Bndg	12.035	13.770	-5.765	0.680	0.31	1.92
SSC #22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	10.366	11.690	-4.398	0.430	0.43	1.44
SSC #23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	12.415	14.120	-5.663	0.600	0.38	2.32
SSC #24	SSC:13	Tee Stiffener Taped Flg Width Bndg	10.847	12.120	-4.229	0.450	0.65	1.99
SSC #25	SSC:14	Disc. Cruciform Axial	14.721	16.960	-7.439	0.910	0.29	2.82
SSC #26	SSC:15	Loaded Edge Attachment Plate	9.566	10.830	-4.200	0.430	0.33	1
SSC #27	SSC:16	Partial Pen. Butt Weld	10.626	12.020	-4.631	0.580	0.39	1.52
SSC #28	SSC:16(G)	Partial Pen. Butt Weld: Ground	13.455	15.550	-6.960	0.950	0.25	2.19
SSC #29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	9.265	10.390	-3.736	0.340	0.45	0.95
SSC #30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.650	0.19	2.01
SSC #31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	9.097	10.140	-3.465	0.390	0.55	0.93
SSC #32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.650	0.19	2.01
SSC #33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	9.048	10.260	-4.027	0.650	0.29	0.78
SSC #34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	15.241	18.020	-9.233	0.750	0.15	1.98
SSC #35	SSC:19	Lapped Flatbar End Weld Only: Axial	12.941	15.190	-7.472	0.930	0.16	1.61
SSC #36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	13.566	15.830	-7.520	0.930	0.19	1.93
SSC #37	SSC:20	Plate Penetration: Axial	10.180	11.570	-4.619	0.660	0.32	1.22
SSC #38	SSC:20(S)	Plate Penetration: Shear	12.695	14.730	-6.759	0.930	0.21	1.8
SSC #39	SSC:21(1/4"WELD)	Plate Penetration: Bending	22.432	26.720	-14.245	0.620	0.14	2.84

Table J-1 – Mean Strength Ratios Unsorted (cont.)

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Arng	B	STD DEV	10^3 cyc	10^8 cyc
SSC #40	SSC:21(3/8"WELD)	Plate Penetration: Bending	20.826	25.490	-15.494	0.620	0.08	1.79
SSC #41	SSC:21(S)	Plate Penetration: Shear	14.765	16.980	-7.358	0.830	0.3	2.93
SSC #42	SSC:22	Tee with Stud Attachment: Bndg	9.093	10.040	-3.147	0.320	0.85	1.02
SSC #43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.981	9.940	-3.187	0.130	0.74	0.93
SSC #44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.981	9.940	-3.187	0.130	0.74	0.93
SSC #45	SSC:25	Continuous Cruciform	13.656	15.790	-7.090	0.780	0.25	2.25
SSC #46	SSC:25A	Plate with Transv. Side Attachment	16.906	19.470	-8.518	0.910	0.31	3.73
SSC #47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	13.053	15.150	-6.966	0.630	0.22	1.91
SSC #48	SSC:26	Welded Cover Plate	9.122	10.130	-3.348	0.610	0.65	0.98
SSC #49	SSC:27	Double Lapped Plate with Plug Welds	8.453	9.400	-3.146	0.580	0.53	0.64
SSC #50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	10.471	12.060	-5.277	0.540	0.22	1.16
SSC #51	SSC:28	Baseplate with Circular Hole	15.078	17.410	-7.746	0.810	0.27	2.84
SSC #52	SSC:30	Long Finite Plate Attchmnt: Axial	8.919	9.870	-3.159	0.310	0.74	0.89
SSC #53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.566	10.580	-3.368	0.100	0.86	1.31
SSC #54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	9.361	10.670	-4.348	0.620	0.26	0.86
SSC #55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	9.091	10.130	-3.453	0.440	0.56	0.93
SSC #56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	9.566	10.830	-4.200	0.430	0.33	1
SSC #57	SSC:32B	Abrupt Change in Flange Width:Bndg	8.646	9.710	-3.533	0.620	0.38	0.68
SSC #58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	8.758	9.860	-3.660	0.500	0.35	0.71
SSC #59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	16.469	19.590	-10.368	0.810	0.13	2.05
SSC #60	SSC:35	Butt Weld with Backing Bar	9.604	10.750	-3.808	0.280	0.51	1.15
SSC #61	SSC:36	Skip Welded Plates with Rathole	13.053	15.150	-6.966	0.630	0.22	1.91
SSC #62	SSC:36A	Skip Welded Plates	11.326	12.880	-5.163	0.460	0.35	1.75
SSC #63	SSC:38	Stiffener Plate Penetration: Bndg	9.128	10.170	-3.462	0.360	0.57	0.95
SSC #64	SSC:38(S)	Stiffener Plate Penetration: Shear	14.312	17.390	-10.225	0.880	0.09	1.3
SSC #65	SSC:40	Stiffener Intersection: Bending	8.646	9.710	-3.533	0.620	0.38	0.68
SSC #66	SSC:42	Bending of Long Attachment	14.765	16.980	-7.358	0.830	0.3	2.93
SSC #67	SSC:46	Long. Welds on Support Gussets: Axial	9.361	10.670	-4.348	0.620	0.26	0.86
SSC #68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.781	10.930	-3.818	0.070	0.56	1.27
SSC #69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	10.023	11.240	-4.042	0.190	0.5	1.35
GENERIC	Generic S/N Curve		9.000	9.903	-3.000	0.000	1	1

Table J-2 – Mean Strength Ratios Sorted at 10^3 Cycles

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Arng	B	STD DEV	10^3 cyc	10^8 cyc
SSC #40	SSC:21(3/8"WELD)	Plate Penetration: Bending	20.826	25.490	-15.494	0.620	0.08	1.79
SSC #64	SSC:38(S)	Stiffener Plate Penetration: Shear	14.312	17.390	-10.225	0.880	0.09	1.3
SSC #59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	16.469	19.590	-10.368	0.810	0.13	2.05
SSC #39	SSC:21(1/4"WELD)	Plate Penetration: Bending	22.432	26.720	-14.245	0.620	0.14	2.84
SSC #34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	15.241	18.020	-9.233	0.750	0.15	1.98
SSC #35	SSC:19	Lapped Flatbar End Weld Only: Axial	12.941	15.190	-7.472	0.930	0.16	1.61
SSC #15	SSC:9	Riveted Single Lap	16.687	19.590	-9.643	0.900	0.18	2.55
BS5400 #9	BS5400 S/N CURVE: S	Shear connectors in concrete	14.214	16.623	-8.000	0.504	0.19	2.05
SSC #17	SSC:10H	Butt Weld Axial:HSLA Steel	22.068	25.920	-12.795	0.960	0.19	3.62
SSC #30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.650	0.19	2.01
SSC #32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.650	0.19	2.01
SSC #36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	13.566	15.830	-7.520	0.930	0.19	1.93
SSC #2	SSC:1M	Baseplate Mild Steel	21.679	25.360	-12.229	0.710	0.21	3.85
SSC #38	SSC:20(S)	Plate Penetration: Shear	12.695	14.730	-6.759	0.930	0.21	1.8
SSC #3	SSC:1H	Baseplate HSLA Steel	27.389	32.040	-15.449	0.910	0.22	4.8
SSC #47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	13.053	15.150	-6.966	0.630	0.22	1.91
SSC #50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	10.471	12.060	-5.277	0.540	0.22	1.16
SSC #61	SSC:36	Skip Welded Plates with Rathole	13.053	15.150	-6.966	0.630	0.22	1.91
SSC #16	SSC:10M	Butt Weld Axial:Mild Steel	14.345	16.630	-7.589	0.880	0.24	2.4
SSC #28	SSC:16(G)	Partial Pen. Butt Weld: Ground	13.455	15.550	-6.960	0.950	0.25	2.19
SSC #45	SSC:25	Continuous Cruciform	13.656	15.790	-7.090	0.780	0.25	2.25
SSC #54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	9.361	10.670	-4.348	0.620	0.26	0.86
SSC #67	SSC:46	Long. Welds on Support Gussets: Axial	9.361	10.670	-4.348	0.620	0.26	0.86
SSC #51	SSC:28	Baseplate with Circular Hole	15.078	17.410	-7.746	0.810	0.27	2.84
NSWC #14	HS misaligned cruciform	Half thickness misalignment, full penetration	12.902	14.833	-6.416	0.142	0.28	2.15
SSC #25	SSC:14	Disc. Cruciform Axial	14.721	16.960	-7.439	0.910	0.29	2.82
SSC #33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	9.048	10.260	-4.027	0.650	0.29	0.78
NSWC #17	OS misaligned cruciform	Half thickness misalignment, full penetration	10.541	12.023	-4.924	0.149	0.3	1.32
SSC #41	SSC:21(S)	Plate Penetration: Shear	14.765	16.980	-7.358	0.830	0.3	2.93
SSC #66	SSC:42	Bending of Long Attachment	14.765	16.980	-7.358	0.830	0.3	2.93
SSC #21	SSC:11	I-Bm Butt Weld Bndg	12.035	13.770	-5.765	0.680	0.31	1.92
SSC #46	SSC:25A	Plate with Transv. Side Attachment	16.906	19.470	-8.518	0.910	0.31	3.73
SSC #37	SSC:20	Plate Penetration: Axial	10.180	11.570	-4.619	0.660	0.32	1.22
SSC #26	SSC:15	Loaded Edge Attachment Plate	9.566	10.830	-4.200	0.430	0.33	1
SSC #56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	9.566	10.830	-4.200	0.430	0.33	1
SSC #19	SSC:10(G)	Butt Weld Axial:Ground	14.784	16.930	-7.130	0.940	0.35	3.19
SSC #58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	8.758	9.860	-3.660	0.500	0.35	0.71
SSC #62	SSC:36A	Skip Welded Plates	11.326	12.880	-5.163	0.460	0.35	1.75
SSC #8	SSC:3(G)	Ground Long. Seam	13.602	15.520	-6.370	0.740	0.37	2.81
SSC #23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	12.415	14.120	-5.663	0.600	0.38	2.32
SSC #57	SSC:32B	Abrupt Change in Flange Width:Bndg	8.646	9.710	-3.533	0.620	0.38	0.68
SSC #65	SSC:40	Stiffener Intersection: Bending	8.646	9.710	-3.533	0.620	0.38	0.68
SSC #7	SSC:3	Longitudinal Seam	13.010	14.800	-5.946	0.630	0.39	2.64
SSC #27	SSC:16	Partial Pen. Butt Weld	10.626	12.020	-4.631	0.580	0.39	1.52
NSWC #20	HSLA INTERCOASTAL	Discontinuous bulkhead penetration, R=0	9.699	10.930	-4.088	0.120	0.4	1.11

Table J-2 – Mean Strength Ratios Sorted at 10^3 Cycles (cont.)

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Amg)	B	STD DEV	10^3 cyc	10^8 cyc
SSC #9	SSC:4	Long. Fillet Weld Bndg	12.515	14.220	-5.663	0.610	0.4	2.42
SSC #11	SSC:6	Dbl I-Bm Bndg	12.515	14.220	-5.663	0.610	0.4	2.42
NSWC #11	HSLA misaligned partial penetration welds	Half thickness misalignment, partial penetration	8.513	9.521	-3.349	0.208	0.43	0.64
SSC #22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	10.366	11.690	-4.398	0.430	0.43	1.44
SSC #14	SSC:8	Bolted Double Lap	14.469	16.440	-6.549	0.810	0.45	3.58
SSC #29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	9.265	10.390	-3.736	0.340	0.45	0.95
SSC #20	SSC:10A	Butt Weld Bndg	12.494	14.140	-5.468	0.790	0.46	2.59
NSWC #9	HSLA misaligned cruciform	Half thickness misalignment, full penetration	9.733	10.922	-3.949	0.227	0.47	1.18
NSWC #26	HSLA Insert Plate "Poor Weld"	Lack of fusion defects in weld	9.845	11.051	-4.009	0.103	0.47	1.24
NSWC #23	HSLA Opening Detail	Reinforced opening detail	8.923	9.971	-3.480	0.203	0.48	0.82
SSC #13	SSC:7P	I-Bm w/vrt Web St Prin Stress	10.204	11.460	-4.172	0.510	0.49	1.43
SSC #69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	10.023	11.240	-4.042	0.190	0.5	1.35
SSC #18	SSC:10Q	Butt Weld Axial:Q&T Steel	12.108	13.650	-5.124	0.760	0.51	2.52
SSC #60	SSC:35	Butt Weld with Backing Bar	9.604	10.750	-3.808	0.280	0.51	1.15
BS5400 #1	BS5400 S/N CURVE: W	Weld throat based stresses	8.150	9.054	-3.000	0.184	0.52	0.52
DNV #8	DnV S/N CURVE: W	Partial penetration load carrying welds	8.148	9.052	-3.000	0.185	0.52	0.52
SSC #10	SSC:5	Cvr Plt on I-Bm Flg Bndg	8.663	9.650	-3.278	0.480	0.52	0.72
NSWC #19	HSLA SNIPED COMP	Cont. bhd penetration with sniped bhd stiffener, R=0	10.058	11.267	-4.016	0.139	0.53	1.39
NSWC #25	HSLA Insert Plate "Good Weld"	Half thickness insert plate	12.101	13.633	-5.090	0.184	0.53	2.55
SSC #49	SSC:27	Double Lapped Plate with Plug Welds	8.453	9.400	-3.146	0.580	0.53	0.64
SSC #6	SSC:2	Rolled I-Beam Bending	13.999	15.820	-6.048	0.640	0.54	3.71
SSC #31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	9.097	10.140	-3.465	0.390	0.55	0.93
SSC #55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	9.091	10.130	-3.453	0.440	0.56	0.93
SSC #68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.781	10.930	-3.818	0.070	0.56	1.27
SSC #63	SSC:38	Stiffener Plate Penetration: Bndg	9.128	10.170	-3.462	0.360	0.57	0.95
AASHTO #5	AASHTO S/N CURVE: E	Weld terminations and overlaps	8.329	9.232	-3.000	0.101	0.6	0.6
BS5400 #2	BS5400 S/N CURVE: G	Flange attachments close to edge, undercut	8.338	9.241	-3.000	0.179	0.6	0.6
DNV #7	DnV S/N CURVE: G	Flange attachments close to edge, undercut	8.335	9.238	-3.000	0.179	0.6	0.6
NSWC #12	HS continuous cruciform	Full penetration non-load carrying welds	11.289	12.639	-4.486	0.218	0.63	2.24
NSWC #22	HSLA Stiffener Splice	Stiffener transition detail	10.843	12.122	-4.250	0.177	0.64	1.97
SSC #1	SSC:1(all steels)	Baseplate	13.825	15.550	-5.729	0.750	0.64	3.99
SSC #24	SSC:13	Tee Stiffener Taped Flg Width Bndg	10.847	12.120	-4.229	0.450	0.65	1.99
SSC #48	SSC:26	Welded Cover Plate	9.122	10.130	-3.348	0.610	0.65	0.98
NSWC #2	HSLA 1/4", continuous cruc., shipyard	Full penetration non-load carrying welds	10.714	11.944	-4.087	0.350	0.71	1.97
SSC #12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	10.095	11.230	-3.771	0.530	0.72	1.57
NSWC #15	OS continuous cruciform	Full penetration non-load carrying welds	10.566	11.766	-3.987	0.221	0.73	1.89
SSC #43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.981	9.940	-3.187	0.130	0.74	0.93
SSC #44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.981	9.940	-3.187	0.130	0.74	0.93
SSC #52	SSC:30	Long Finite Plate Attchmnt: Axial	8.919	9.870	-3.159	0.310	0.74	0.89
AASHTO #4	AASHTO S/N CURVE: D	Non-NDE full penetration butt welds, attachments	8.648	9.551	-3.000	0.108	0.76	0.76
NSWC #16	OS discontinuous cruciform	Full penetration load carrying welds	10.185	11.314	-3.752	0.304	0.77	1.67
NSWC #18	HSLA & HS conventional components	Continuous bulkhead penetration, R=0	9.192	10.174	-3.263	0.214	0.77	1.05
SSC #5	SSC:1(F)	Baseplate Flame Cut	12.334	13.780	-4.805	0.600	0.77	3.24
BS5400 #3	BS5400 S/N CURVE: F2	Transverse fillet welds at high SCF areas	8.672	9.575	-3.000	0.228	0.78	0.78
DNV #6	DnV S/N CURVE: F2	Butts in unequal width plates, long attachments	8.672	9.575	-3.000	0.228	0.78	0.78
NSWC #4	HSLA 7/16", continuous cruc., shipyard	Full penetration non-load carrying welds	10.432	11.592	-3.855	0.210	0.79	1.85

Table J-2 – Mean Strength Ratios Sorted at 10^3 Cycles (cont.)

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Arng)	B	STD DEV	10^3 cyc	10^8 cyc
BS5400 #8	BS5400 S/N CURVE: B	Parent plate, as welded	10.812	12.016	-4.000	0.182	0.83	2.17
DNV #1	DnV S/N CURVE: B	base plate or dressed welds	10.813	12.017	-4.000	0.182	0.83	2.17
SSC #4	SSC:1Q	Baseplate Q & T Steel	13.345	14.910	-5.199	0.680	0.83	4.23
NSWC #6	HSLA 3/4", continuous cruc., shipyard	Full penetration non-load carrying welds	9.057	10.000	-3.134	0.172	0.85	1
NSWC #13	HS discontinuous cruciform	Full penetration load carrying welds	9.648	10.677	-3.417	0.252	0.85	1.36
SSC #42	SSC:22	Tee with Stud Attachment: Bndg	9.093	10.040	-3.147	0.320	0.85	1.02
SSC #53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.566	10.580	-3.368	0.100	0.86	1.31
BS5400 #4	BS5400 S/N CURVE: F	Backing strip welds & flange attachments	8.820	9.723	-3.000	0.218	0.87	0.87
DNV #5	DnV S/N CURVE: F	Backing strip welds & short flange attachments	8.819	9.722	-3.000	0.218	0.87	0.87
AASHTO #3	AASHTO S/N CURVE: C	Transverse NDE full penetration butt welds	8.875	9.778	-3.000	0.063	0.91	0.91
NSWC #5	HSLA 7/16", continuous cruc., lab & syd	Full penetration non-load carrying welds	9.947	10.999	-3.496	0.205	0.93	1.61
NSWC #10	HSLA non-full penetration disc cruciform	Partial penetration load carrying welds	8.272	9.081	-2.686	0.139	0.94	0.6
NSWC #28	HSLA single thickness doubler welds	Doubler plate, same thickness doubler	9.179	10.119	-3.122	0.490	0.94	1.1
NSWC #7	HSLA 1", continuous cruc., shipyard	Full penetration non-load carrying welds	8.389	9.211	-2.732	0.068	0.96	0.66
NSWC #21	HSLA CONV CMP R=-1	Continuous bulkhead penetration	9.427	10.399	-3.230	0.169	0.96	1.26
NSWC #8	HSLA discontinuous cruciform	Full penetration load carrying welds	9.601	10.597	-3.307	0.263	0.97	1.38
BS5400 #7	BS5400 S/N CURVE: C	Flame-cut edges and longitudinal welds	10.046	11.100	-3.500	0.204	0.99	1.71
DNV #2	DnV S/N CURVE: C	Flame cut edge or cont. butt & fillet welds	10.047	11.100	-3.500	0.204	0.99	1.71
GENERIC	Generic S/N Curve		9.000	9.903	-3.000	0.000	1	1
NSWC #1	HSLA 7/16" bending, shipyard	Full penetration non-load carrying welds	13.617	15.161	-5.130	0.378	1.01	4.95
NSWC #24	HSLA Flame cut edge	Flame cut edge	10.553	11.668	-3.705	0.092	1.03	2.14
BS5400 #5	BS5400 S/N CURVE: E	Butts in unequal thickness & width, web brackets	9.099	10.003	-3.000	0.251	1.08	1.08
DNV #4	DnV S/N CURVE: E	Butts in unequal thickness & width, dressed welds	9.099	10.002	-3.000	0.251	1.08	1.08
NSWC #3	HSLA 7/16", continuous cruciform	Full penetration non-load carrying welds	9.559	10.525	-3.210	0.185	1.09	1.4
BS5400 #6	BS5400 S/N CURVE: D	Transverse butt welds and start/stop in long	9.183	10.086	-3.000	0.210	1.15	1.15
DNV #3	DnV S/N CURVE: D	Butt & fillet welds with start/stop positions	9.183	10.086	-3.000	0.210	1.15	1.15
DNV #9	DnV S/N CURVE: T	Tubular joints	9.243	10.146	-3.000	0.248	1.21	1.21
NSWC #27	HSLA one sided welds	Permanent backing bar, one sided weld	9.956	10.949	-3.298	0.307	1.25	1.77
NSWC #29	HSLA double thickness doubler welds	Doubler plate, twice thickness doubler	8.843	9.680	-2.780	0.555	1.29	0.95
AASHTO #2	AASHTO S/N CURVE: B	Continuous Longitudinal Welds	9.471	10.374	-3.000	0.147	1.44	1.44
AASHTO #1	AASHTO S/N CURVE: A	Baseplate dressed edges	9.940	10.843	-3.000	0.221	2.06	2.06

Table J-3 – Mean Strength Ratios Sorted at 10^8 Cycles

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Arng	B	STD DEV	10^3 cyc	10^8 cyc
BS5400 #1	BS5400 S/N CURVE: W	Weld throat based stresses	8.150	9.054	-3.000	0.184	0.52	0.52
DNV #8	DnV S/N CURVE: W	Partial penetration load carrying welds	8.148	9.052	-3.000	0.185	0.52	0.52
NSWC #10	HSLA non-full penetration disc cruciform	Partial penetration load carrying welds	8.272	9.081	-2.686	0.139	0.94	0.6
AASHTO #5	AASHTO S/N CURVE: E	Weld terminations and overlaps	8.329	9.232	-3.000	0.101	0.6	0.6
BS5400 #2	BS5400 S/N CURVE: G	Flange attachments close to edge, undercut	8.338	9.241	-3.000	0.179	0.6	0.6
DNV #7	DnV S/N CURVE: G	Flange attachments close to edge, undercut	8.335	9.238	-3.000	0.179	0.6	0.6
NSWC #11	HSLA misaligned partial penetration welds	Half thickness misalignment, partial penetration	8.513	9.521	-3.349	0.208	0.43	0.64
SSC #49	SSC:27	Double Lapped Plate with Plug Welds	8.453	9.400	-3.146	0.580	0.53	0.64
NSWC #7	HSLA 1", continuous cruc., shipyard	Full penetration non-load carrying welds	8.389	9.211	-2.732	0.068	0.96	0.66
SSC #57	SSC:32B	Abrupt Change in Flange Width:Bndg	8.646	9.710	-3.533	0.620	0.38	0.68
SSC #65	SSC:40	Stiffener Intersection: Bending	8.646	9.710	-3.533	0.620	0.38	0.68
SSC #58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	8.758	9.860	-3.660	0.500	0.35	0.71
SSC #10	SSC:5	Cvr Plt on I-Bm Flg Bndg	8.663	9.650	-3.278	0.480	0.52	0.72
AASHTO #4	AASHTO S/N CURVE: D	Non-NDE full penetration butt welds, attachments	8.648	9.551	-3.000	0.108	0.76	0.76
BS5400 #3	BS5400 S/N CURVE: F2	Transverse fillet welds at high SCF areas	8.672	9.575	-3.000	0.228	0.78	0.78
DNV #6	DnV S/N CURVE: F2	Butts in unequal width plates, long attachments	8.672	9.575	-3.000	0.228	0.78	0.78
SSC #33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	9.048	10.260	-4.027	0.650	0.29	0.78
NSWC #23	HSLA Opening Detail	Reinforced opening detail	8.923	9.971	-3.480	0.203	0.48	0.82
SSC #54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	9.361	10.670	-4.348	0.620	0.26	0.86
SSC #67	SSC:46	Long. Welds on Support Gussets: Axial	9.361	10.670	-4.348	0.620	0.26	0.86
BS5400 #4	BS5400 S/N CURVE: F	Backing strip welds & flange attachments	8.820	9.723	-3.000	0.218	0.87	0.87
DNV #5	DnV S/N CURVE: F	Backing strip welds & short flange attachments	8.819	9.722	-3.000	0.218	0.87	0.87
SSC #52	SSC:30	Long Finite Plate Attchmnt: Axial	8.919	9.870	-3.159	0.310	0.74	0.89
AASHTO #3	AASHTO S/N CURVE: C	Transverse NDE full penetration butt welds	8.875	9.778	-3.000	0.063	0.91	0.91
SSC #31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	9.097	10.140	-3.465	0.390	0.55	0.93
SSC #43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.981	9.940	-3.187	0.130	0.74	0.93
SSC #44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.981	9.940	-3.187	0.130	0.74	0.93
SSC #55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	9.091	10.130	-3.453	0.440	0.56	0.93
NSWC #29	HSLA double thickness doubler welds	Doubler plate, twice thickness doubler	8.843	9.680	-2.780	0.555	1.29	0.95
SSC #29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	9.265	10.390	-3.736	0.340	0.45	0.95
SSC #63	SSC:38	Stiffener Plate Penetration: Bndg	9.128	10.170	-3.462	0.360	0.57	0.95
SSC #48	SSC:26	Welded Cover Plate	9.122	10.130	-3.348	0.610	0.65	0.98
NSWC #6	HSLA 3/4", continuous cruc., shipyard	Full penetration non-load carrying welds	9.057	10.000	-3.134	0.172	0.85	1
SSC #26	SSC:15	Loaded Edge Attachment Plate	9.566	10.830	-4.200	0.430	0.33	1
SSC #56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	9.566	10.830	-4.200	0.430	0.33	1
GENERIC	Generic S/N Curve		9.000	9.903	-3.000	0.000	1	1
SSC #42	SSC:22	Tee with Stud Attachment: Bndg	9.093	10.040	-3.147	0.320	0.85	1.02
NSWC #18	HSLA & HS conventional components	Continuous bulkhead penetration, R=0	9.192	10.174	-3.263	0.214	0.77	1.05
BS5400 #5	BS5400 S/N CURVE: E	Butts in unequal thickness & width, web brackets	9.099	10.003	-3.000	0.251	1.08	1.08
DNV #4	DnV S/N CURVE: E	Butts in unequal thickness & width, dressed welds	9.099	10.002	-3.000	0.251	1.08	1.08
NSWC #28	HSLA single thickness doubler welds	Doubler plate, same thickness doubler	9.179	10.119	-3.122	0.490	0.94	1.1
NSWC #20	HSLA INTERCOASTAL	Discontinuous bulkhead penetration, R=0	9.699	10.930	-4.088	0.120	0.4	1.11
BS5400 #6	BS5400 S/N CURVE: D	Transverse butt welds and start/stop in long	9.183	10.086	-3.000	0.210	1.15	1.15
DNV #3	DnV S/N CURVE: D	Butt & fillet welds with start/stop positions	9.183	10.086	-3.000	0.210	1.15	1.15
SSC #60	SSC:35	Butt Weld with Backing Bar	9.604	10.750	-3.808	0.280	0.51	1.15

Table J-3 – Mean Strength Ratios Sorted at 10^8 Cycles (cont.)

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Amg)	B	STD DEV	10^3 cyc	10^8 cyc
SSC #50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	10.471	12.060	-5.277	0.540	0.22	1.16
NSWC #9	HSLA misaligned cruciform	Half thickness misalignment, full penetration	9.733	10.922	-3.949	0.227	0.47	1.18
DNV #9	DnV S/N CURVE: T	Tubular joints	9.243	10.146	-3.000	0.248	1.21	1.21
SSC #37	SSC:20	Plate Penetration: Axial	10.180	11.570	-4.619	0.660	0.32	1.22
NSWC #26	HSLA Insert Plate "Poor Weld"	Lack of fusion defects in weld	9.845	11.051	-4.009	0.103	0.47	1.24
NSWC #21	HSLA CONV CMP R=-1	Continuous bulkhead penetration	9.427	10.399	-3.230	0.169	0.96	1.26
SSC #68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.781	10.930	-3.818	0.070	0.56	1.27
SSC #64	SSC:38(S)	Stiffener Plate Penetration: Shear	14.312	17.390	-10.225	0.880	0.09	1.3
SSC #53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.566	10.580	-3.368	0.100	0.86	1.31
NSWC #17	OS misaligned cruciform	Half thickness misalignment, full penetration	10.541	12.023	-4.924	0.149	0.3	1.32
SSC #69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	10.023	11.240	-4.042	0.190	0.5	1.35
NSWC #13	HS discontinuous cruciform	Full penetration load carrying welds	9.648	10.677	-3.417	0.252	0.85	1.36
NSWC #8	HSLA discontinuous cruciform	Full penetration load carrying welds	9.601	10.597	-3.307	0.263	0.97	1.38
NSWC #19	HSLA SNIPED COMP	Cont. bhd penetration with sniped bhd stiffener, R=0	10.058	11.267	-4.016	0.139	0.53	1.39
NSWC #3	HSLA 7/16", continuous cruciform	Full penetration non-load carrying welds	9.559	10.525	-3.210	0.185	1.09	1.4
SSC #13	SSC:7P	I-Bm w/vrt Web St Prin Stress	10.204	11.460	-4.172	0.510	0.49	1.43
AASHTO #2	AASHTO S/N CURVE: B	Continuous Longitudinal Welds	9.471	10.374	-3.000	0.147	1.44	1.44
SSC #22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	10.366	11.690	-4.398	0.430	0.43	1.44
SSC #27	SSC:16	Partial Pen. Butt Weld	10.626	12.020	-4.631	0.580	0.39	1.52
SSC #12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	10.095	11.230	-3.771	0.530	0.72	1.57
NSWC #5	HSLA 7/16", continuous cruc., lab & syd	Full penetration non-load carrying welds	9.947	10.999	-3.496	0.205	0.93	1.61
SSC #35	SSC:19	Lapped Flatbar End Weld Only: Axial	12.941	15.190	-7.472	0.930	0.16	1.61
NSWC #16	OS discontinuous cruciform	Full penetration load carrying welds	10.185	11.314	-3.752	0.304	0.77	1.67
BS5400 #7	BS5400 S/N CURVE: C	Flame-cut edges and longitudinal welds	10.046	11.100	-3.500	0.204	0.99	1.71
DNV #2	DnV S/N CURVE: C	Flame cut edge or cont. butt & fillet welds	10.047	11.100	-3.500	0.204	0.99	1.71
SSC #62	SSC:36A	Skip Welded Plates	11.326	12.880	-5.163	0.460	0.35	1.75
NSWC #27	HSLA one sided welds	Permanent backing bar, one sided weld	9.956	10.949	-3.298	0.307	1.25	1.77
SSC #40	SSC:21(3/8"WELD)	Plate Penetration: Bending	20.826	25.490	-15.494	0.620	0.08	1.79
SSC #38	SSC:20(S)	Plate Penetration: Shear	12.695	14.730	-6.759	0.930	0.21	1.8
NSWC #4	HSLA 7/16", continuous cruc., shipyard	Full penetration non-load carrying welds	10.432	11.592	-3.855	0.210	0.79	1.85
NSWC #15	OS continuous cruciform	Full penetration non-load carrying welds	10.566	11.766	-3.987	0.221	0.73	1.89
SSC #47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	13.053	15.150	-6.966	0.630	0.22	1.91
SSC #61	SSC:36	Skip Welded Plates with Rathole	13.053	15.150	-6.966	0.630	0.22	1.91
SSC #21	SSC:11	I-Bm Butt Weld Bndg	12.035	13.770	-5.765	0.680	0.31	1.92
SSC #36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	13.566	15.830	-7.520	0.930	0.19	1.93
NSWC #2	HSLA 1/4", continuous cruc., shipyard	Full penetration non-load carrying welds	10.714	11.944	-4.087	0.350	0.71	1.97
NSWC #22	HSLA Stiffener Splice	Stiffener transition detail	10.843	12.122	-4.250	0.177	0.64	1.97
SSC #34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	15.241	18.020	-9.233	0.750	0.15	1.98
SSC #24	SSC:13	Tee Stiffener Taped Flg Width Bndg	10.847	12.120	-4.229	0.450	0.65	1.99
SSC #30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.650	0.19	2.01
SSC #32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	13.937	16.280	-7.782	0.650	0.19	2.01
BS5400 #9	BS5400 S/N CURVE: S	Shear connectors in concrete	14.214	16.623	-8.000	0.504	0.19	2.05
SSC #59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	16.469	19.590	-10.368	0.810	0.13	2.05
AASHTO #1	AASHTO S/N CURVE: A	Baseplate dressed edges	9.940	10.843	-3.000	0.221	2.06	2.06
NSWC #24	HSLA Flame cut edge	Flame cut edge	10.553	11.668	-3.705	0.092	1.03	2.14
NSWC #14	HS misaligned cruciform	Half thickness misalignment, full penetration	12.902	14.833	-6.416	0.142	0.28	2.15

Table J-3 – Mean Strength Ratios Sorted at 10^8 Cycles (cont.)

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Arng	B	STD DEV	10^3 cyc	10^8 cyc
BS5400 #8	BS5400 S/N CURVE: B	Parent plate, as welded	10.812	12.016	-4.000	0.182	0.83	2.17
DNV #1	DnV S/N CURVE: B	base plate or dressed welds	10.813	12.017	-4.000	0.182	0.83	2.17
SSC #28	SSC:16(G)	Partial Pen. Butt Weld: Ground	13.455	15.550	-6.960	0.950	0.25	2.19
NSWC #12	HS continuous cruciform	Full penetration non-load carrying welds	11.289	12.639	-4.486	0.218	0.63	2.24
SSC #45	SSC:25	Continuous Cruciform	13.656	15.790	-7.090	0.780	0.25	2.25
SSC #23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	12.415	14.120	-5.663	0.600	0.38	2.32
SSC #16	SSC:10M	Butt Weld Axial:Mild Steel	14.345	16.630	-7.589	0.880	0.24	2.4
SSC #9	SSC:4	Long. Fillet Weld Bndg	12.515	14.220	-5.663	0.610	0.4	2.42
SSC #11	SSC:6	Dbl I-Bm Bndg	12.515	14.220	-5.663	0.610	0.4	2.42
SSC #18	SSC:10Q	Butt Weld Axial:Q&T Steel	12.108	13.650	-5.124	0.760	0.51	2.52
NSWC #25	HSLA Insert Plate "Good Weld"	Half thickness insert plate	12.101	13.633	-5.090	0.184	0.53	2.55
SSC #15	SSC:9	Riveted Single Lap	16.687	19.590	-9.643	0.900	0.18	2.55
SSC #20	SSC:10A	Butt Weld Bndg	12.494	14.140	-5.468	0.790	0.46	2.59
SSC #7	SSC:3	Longitudinal Seam	13.010	14.800	-5.946	0.630	0.39	2.64
SSC #8	SSC:3(G)	Ground Long. Seam	13.602	15.520	-6.370	0.740	0.37	2.81
SSC #25	SSC:14	Disc. Cruciform Axial	14.721	16.960	-7.439	0.910	0.29	2.82
SSC #39	SSC:21(1/4"WELD)	Plate Penetration: Bending	22.432	26.720	-14.245	0.620	0.14	2.84
SSC #51	SSC:28	Baseplate with Circular Hole	15.078	17.410	-7.746	0.810	0.27	2.84
SSC #41	SSC:21(S)	Plate Penetration: Shear	14.765	16.980	-7.358	0.830	0.3	2.93
SSC #66	SSC:42	Bending of Long Attachment	14.765	16.980	-7.358	0.830	0.3	2.93
SSC #19	SSC:10(G)	Butt Weld Axial:Ground	14.784	16.930	-7.130	0.940	0.35	3.19
SSC #5	SSC:1(F)	Baseplate Flame Cut	12.334	13.780	-4.805	0.600	0.77	3.24
SSC #14	SSC:8	Bolted Double Lap	14.469	16.440	-6.549	0.810	0.45	3.58
SSC #17	SSC:10H	Butt Weld Axial:HSLA Steel	22.068	25.920	-12.795	0.960	0.19	3.62
SSC #6	SSC:2	Rolled I-Beam Bending	13.999	15.820	-6.048	0.640	0.54	3.71
SSC #46	SSC:25A	Plate with Transv. Side Attachment	16.906	19.470	-8.518	0.910	0.31	3.73
SSC #2	SSC:1M	Baseplate Mild Steel	21.679	25.360	-12.229	0.710	0.21	3.85
SSC #1	SSC:1(all steels)	Baseplate	13.825	15.550	-5.729	0.750	0.64	3.99
SSC #4	SSC:1Q	Baseplate Q & T Steel	13.345	14.910	-5.199	0.680	0.83	4.23
SSC #3	SSC:1H	Baseplate HSLA Steel	27.389	32.040	-15.449	0.910	0.22	4.8
NSWC #1	HSLA 7/16" bending, shipyard	Full penetration non-load carrying welds	13.617	15.161	-5.130	0.378	1.01	4.95

Table J-4 – Mean Minus 2 Sigma Strength Ratios
Unsorted

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Amg)	B	STD DEV	10^3 cyc	10^8 cyc
NSWC #1	HSLA 7/16" bending, shipyard	Full penetration non-load carrying welds	12.861	14.405	-5.130	0.378	0.72	3.53
NSWC #2	HSLA 1/4", continuous cruc., shipyard	Full penetration non-load carrying welds	10.014	11.244	-4.087	0.350	0.48	1.33
NSWC #3	HSLA 7/16", continuous cruciform	Full penetration non-load carrying welds	9.189	10.155	-3.210	0.185	0.83	1.07
NSWC #4	HSLA 7/16", continuous cruc., shipyard	Full penetration non-load carrying welds	10.012	11.172	-3.855	0.210	0.62	1.44
NSWC #5	HSLA 7/16", continuous cruc., lab & syd	Full penetration non-load carrying welds	9.537	10.589	-3.496	0.205	0.71	1.23
NSWC #6	HSLA 3/4", continuous cruc., shipyard	Full penetration non-load carrying welds	8.713	9.656	-3.134	0.172	0.66	0.77
NSWC #7	HSLA 1", continuous cruc., shipyard	Full penetration non-load carrying welds	8.253	9.075	-2.732	0.068	0.86	0.59
NSWC #8	HSLA discontinuous cruciform	Full penetration load carrying welds	9.075	10.071	-3.307	0.263	0.67	0.96
NSWC #9	HSLA misaligned cruciform	Half thickness misalignment, full penetration	9.279	10.468	-3.949	0.227	0.36	0.91
NSWC #10	HSLA non-full penetration disc cruciform	Partial penetration load carrying welds	7.994	8.803	-2.686	0.139	0.74	0.47
NSWC #11	HSLA misaligned partial penetration welds	Half thickness misalignment, partial penetration	8.097	9.105	-3.349	0.208	0.32	0.48
NSWC #12	HS continuous cruciform	Full penetration non-load carrying welds	10.853	12.203	-4.486	0.218	0.50	1.79
NSWC #13	HS discontinuous cruciform	Full penetration load carrying welds	9.144	10.173	-3.417	0.252	0.61	0.97
NSWC #14	HS misaligned cruciform	Half thickness misalignment, full penetration	12.618	14.549	-6.416	0.142	0.25	1.94
NSWC #15	OS continuous cruciform	Full penetration non-load carrying welds	10.124	11.324	-3.987	0.221	0.57	1.46
NSWC #16	OS discontinuous cruciform	Full penetration load carrying welds	9.577	10.706	-3.752	0.304	0.53	1.15
NSWC #17	OS misaligned cruciform	Half thickness misalignment, full penetration	10.243	11.725	-4.924	0.149	0.26	1.15
NSWC #18	HSLA & HS conventional components	Continuous bulkhead penetration, R=0	8.764	9.746	-3.263	0.214	0.57	0.78
NSWC #19	HSLA SNIPED COMP	Cont. bhd penetration with sniped bhd stiffener, R=0	9.780	10.989	-4.016	0.139	0.45	1.19
NSWC #20	HSLA INTERCOASTAL	Discontinuous bulkhead penetration, R=0	9.459	10.690	-4.088	0.120	0.35	0.97
NSWC #21	HSLA CONV CMP R=-1	Continuous bulkhead penetration	9.089	10.061	-3.230	0.169	0.75	0.99
NSWC #22	HSLA Stiffener Splice	Stiffener transition detail	10.489	11.768	-4.250	0.177	0.53	1.62
NSWC #23	HSLA Opening Detail	Reinforced opening detail	8.517	9.565	-3.480	0.203	0.37	0.63
NSWC #24	HSLA Flame cut edge	Flame cut edge	10.369	11.484	-3.705	0.092	0.92	1.91
NSWC #25	HSLA Insert Plate "Good Weld"	Half thickness insert plate	11.733	13.265	-5.090	0.184	0.45	2.16
NSWC #26	HSLA Insert Plate "Poor Weld"	Lack of fusion defects in weld	9.639	10.845	-4.009	0.103	0.42	1.10
NSWC #27	HSLA one sided welds	Permanent backing bar, one sided weld	9.342	10.335	-3.298	0.307	0.82	1.16
NSWC #28	HSLA single thickness doubler welds	Doubler plate, same thickness doubler	8.199	9.139	-3.122	0.490	0.46	0.53
NSWC #29	HSLA double thickness doubler welds	Doubler plate, twice thickness doubler	7.733	8.570	-2.780	0.555	0.51	0.38
AASHTO #1	AASHTO S/N CURVE: A	Baseplate dressed edges	9.499	10.402	-3.000	0.221	1.47	1.47
AASHTO #2	AASHTO S/N CURVE: B	Continuous Longitudinal Welds	9.178	10.081	-3.000	0.147	1.15	1.15
AASHTO #3	AASHTO S/N CURVE: C	Transverse NDE full penetration butt welds	8.750	9.653	-3.000	0.063	0.83	0.83
AASHTO #4	AASHTO S/N CURVE: D	Non-NDE full penetration butt welds, attachments	8.433	9.336	-3.000	0.108	0.65	0.65
AASHTO #5	AASHTO S/N CURVE: E	Weld terminations and overlaps	8.128	9.031	-3.000	0.101	0.51	0.51
BS5400 #1	BS5400 S/N CURVE: W	Weld throat based stresses	7.782	8.685	-3.000	0.184	0.39	0.39
BS5400 #2	BS5400 S/N CURVE: G	Flange attachments close to edge, undercut	7.980	8.883	-3.000	0.179	0.46	0.46
BS5400 #3	BS5400 S/N CURVE: F2	Transverse fillet welds at high SCF areas	8.217	9.120	-3.000	0.228	0.55	0.55
BS5400 #4	BS5400 S/N CURVE: F	Backing strip welds & flange attachments	8.384	9.287	-3.000	0.218	0.62	0.62
BS5400 #5	BS5400 S/N CURVE: E	Butts in unequal thickness & width, web brackets	8.597	9.500	-3.000	0.251	0.73	0.73
BS5400 #6	BS5400 S/N CURVE: D	Transverse butt welds and start/stop in long	8.764	9.667	-3.000	0.210	0.83	0.83
BS5400 #7	BS5400 S/N CURVE: C	Flame-cut edges and longitudinal welds	9.638	10.691	-3.500	0.204	0.76	1.31
BS5400 #8	BS5400 S/N CURVE: B	Parent plate, as welded	10.447	11.651	-4.000	0.182	0.67	1.76
BS5400 #9	BS5400 S/N CURVE: S	Shear connectors in concrete	13.205	15.614	-8.000	0.504	0.14	1.53
DNV #1	DnV S/N CURVE: B	base plate or dressed welds	10.449	11.653	-4.000	0.182	0.67	1.76
DNV #2	DnV S/N CURVE: C	Flame cut edge or cont. butt & fillet welds	9.639	10.692	-3.500	0.204	0.76	1.31

Table J-4 – Mean Minus 2 Sigma Strength Ratios
Unsorted (cont.)

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Arng)	B	STD DEV	10^3 cyc	10^8 cyc
DNV #3	DnV S/N CURVE: D	Butt & fillet welds with start/stop positions	8.764	9.667	-3.000	0.210	0.83	0.83
DNV #4	DnV S/N CURVE: E	Butts in unequal thickness & width, dressed welds	8.597	9.500	-3.000	0.251	0.73	0.73
DNV #5	DnV S/N CURVE: F	Backing strip welds & short flange attachments	8.383	9.286	-3.000	0.218	0.62	0.62
DNV #6	DnV S/N CURVE: F2	Butts in unequal width plates, long attachments	8.216	9.120	-3.000	0.228	0.55	0.55
DNV #7	DnV S/N CURVE: G	Flange attachments close to edge, undercut	7.976	8.879	-3.000	0.179	0.46	0.46
DNV #8	DnV S/N CURVE: W	Partial penetration load carrying welds	7.779	8.682	-3.000	0.185	0.39	0.39
DNV #9	DnV S/N CURVE: T	Tubular joints	8.746	9.649	-3.000	0.248	0.82	0.82
EURO #1	EUROCODE S/N CURVE: 434 (160)	Baseplate	9.495	10.398	-3.000	n/a	1.46	1.46
EURO #2	EUROCODE S/N CURVE: 380 (140)	Dressed cut edge, bolted connections	9.322	10.225	-3.000	n/a	1.28	1.28
EURO #3	EUROCODE S/N CURVE: 339 (125)	Flame cut edge, cont. long. fillet welds	9.173	10.076	-3.000	n/a	1.14	1.14
EURO #4	EUROCODE S/N CURVE: 304 (112)	Cont. long. fillet welds with start/stop, tapered ground	9.031	9.934	-3.000	n/a	1.02	1.02
EURO #5	EUROCODE S/N CURVE: 271 (100)	Manual butt & fillet welds and repairs	8.881	9.784	-3.000	n/a	0.91	0.91
EURO #6	EUROCODE S/N CURVE: 244 (90)	Tapered width & thickness, as-welded	8.744	9.648	-3.000	n/a	0.82	0.82
EURO #7	EUROCODE S/N CURVE: 217 (80)	Intermittent long. Welds, short thin attachments	8.592	9.495	-3.000	n/a	0.73	0.73
EURO #8	EUROCODE S/N CURVE: 193 (71)	Weld terminations, backing bar, thick trans. attchmt	8.439	9.342	-3.000	n/a	0.65	0.65
EURO #9	EUROCODE S/N CURVE: 171 (63)	Overlapped welds,	8.281	9.184	-3.000	n/a	0.58	0.58
EURO #10	EUROCODE S/N CURVE: 152 (56)	Rect. hollow welded connections	8.128	9.031	-3.000	n/a	0.51	0.51
EURO #11	EUROCODE S/N CURVE: 136 (50)	Long attachments, thin cover plates	7.983	8.886	-3.000	n/a	0.46	0.46
EURO #12	EUROCODE S/N CURVE: 122 (45)	Overlapped welds,	7.841	8.744	-3.000	n/a	0.41	0.41
EURO #13	EUROCODE S/N CURVE: 109 (40)	Circular hollow welded connections w/ intermediate plt	7.695	8.598	-3.000	n/a	0.37	0.37
EURO #14	EUROCODE S/N CURVE: 98 (36)	threaded connections, thick cover plates	7.556	8.459	-3.000	n/a	0.33	0.33
SSC #1	SSC:1(all steels)	Baseplate	12.325	14.050	-5.729	0.750	0.35	2.19
SSC #2	SSC:1M	Baseplate Mild Steel	20.259	23.940	-12.229	0.710	0.16	2.94
SSC #3	SSC:1H	Baseplate HSLA Steel	25.569	30.220	-15.449	0.910	0.17	3.66
SSC #4	SSC:1Q	Baseplate Q & T Steel	11.985	13.550	-5.199	0.680	0.46	2.32
SSC #5	SSC:1(F)	Baseplate Flame Cut	11.134	12.580	-4.805	0.600	0.43	1.82
SSC #6	SSC:2	Rolled I-Beam Bending	12.719	14.540	-6.048	0.640	0.33	2.28
SSC #7	SSC:3	Longitudinal Seam	11.750	13.540	-5.946	0.630	0.24	1.62
SSC #8	SSC:3(G)	Ground Long. Seam	12.122	14.040	-6.370	0.740	0.22	1.65
SSC #9	SSC:4	Long. Fillet Weld Bndg	11.295	13.000	-5.663	0.610	0.24	1.47
SSC #10	SSC:5	Cvr Plt on I-Bm Flg Bndg	7.703	8.690	-3.278	0.480	0.27	0.37
SSC #11	SSC:6	Dbl I-Bm Bndg	11.295	13.000	-5.663	0.610	0.24	1.47
SSC #12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	9.035	10.170	-3.771	0.530	0.37	0.82
SSC #13	SSC:7P	I-Bm w/vrt Web St Prin Stress	9.184	10.440	-4.172	0.510	0.28	0.81
SSC #14	SSC:8	Bolted Double Lap	12.849	14.820	-6.549	0.810	0.25	2.02
SSC #15	SSC:9	Riveted Single Lap	14.887	17.790	-9.643	0.900	0.12	1.66
SSC #16	SSC:10M	Butt Weld Axial:Mild Steel	12.585	14.870	-7.589	0.880	0.14	1.4
SSC #17	SSC:10H	Butt Weld Axial:HSLA Steel	20.148	24.000	-12.795	0.960	0.14	2.56
SSC #18	SSC:10Q	Butt Weld Axial:Q&T Steel	10.588	12.130	-5.124	0.760	0.26	1.27
SSC #19	SSC:10(G)	Butt Weld Axial:Ground	12.904	15.050	-7.130	0.940	0.19	1.74
SSC #20	SSC:10A	Butt Weld Bndg	10.914	12.560	-5.468	0.790	0.24	1.33
SSC #21	SSC:11	I-Bm Butt Weld Bndg	10.675	12.410	-5.765	0.680	0.18	1.12
SSC #22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	9.506	10.830	-4.398	0.430	0.27	0.92
SSC #23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	11.215	12.920	-5.663	0.600	0.23	1.43
SSC #24	SSC:13	Tee Stiffener Taped Flg Width Bndg	9.947	11.220	-4.229	0.450	0.4	1.22
SSC #25	SSC:14	Disc. Cruciform Axial	12.901	15.140	-7.439	0.910	0.16	1.6

Table J-4 – Mean Minus 2 Sigma Strength Ratios
Unsorted (cont.)

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Amg)	B	STD DEV	10^3 cyc	10^8 cyc
SSC #26	SSC:15	Loaded Edge Attachment Plate	8.706	9.970	-4.200	0.430	0.21	0.62
SSC #27	SSC:16	Partial Pen. Butt Weld	9.466	10.860	-4.631	0.580	0.22	0.85
SSC #28	SSC:16(G)	Partial Pen. Butt Weld: Ground	11.555	13.650	-6.960	0.950	0.13	1.17
SSC #29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	8.585	9.710	-3.736	0.340	0.29	0.63
SSC #30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.650	0.13	1.37
SSC #31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	8.317	9.360	-3.465	0.390	0.33	0.55
SSC #32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.650	0.13	1.37
SSC #33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	7.748	8.960	-4.027	0.650	0.14	0.37
SSC #34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	13.741	16.520	-9.233	0.750	0.1	1.36
SSC #35	SSC:19	Lapped Flatbar End Weld Only: Axial	11.081	13.330	-7.472	0.930	0.09	0.91
SSC #36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	11.706	13.970	-7.520	0.930	0.11	1.09
SSC #37	SSC:20	Plate Penetration: Axial	8.860	10.250	-4.619	0.660	0.16	0.63
SSC #38	SSC:20(S)	Plate Penetration: Shear	10.835	12.870	-6.759	0.930	0.11	0.96
SSC #39	SSC:21(1/4"WELD)	Plate Penetration: Bending	21.192	25.480	-14.245	0.620	0.11	2.33
SSC #40	SSC:21(3/8"WELD)	Plate Penetration: Bending	19.586	24.250	-15.494	0.620	0.07	1.49
SSC #41	SSC:21(S)	Plate Penetration: Shear	13.105	15.320	-7.358	0.830	0.18	1.75
SSC #42	SSC:22	Tee with Stud Attachment: Bndg	8.453	9.400	-3.147	0.320	0.53	0.64
SSC #43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.721	9.680	-3.187	0.130	0.61	0.77
SSC #44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.721	9.680	-3.187	0.130	0.61	0.77
SSC #45	SSC:25	Continuous Cruciform	12.096	14.230	-7.090	0.780	0.15	1.35
SSC #46	SSC:25A	Plate with Transv. Side Attachment	15.086	17.650	-8.518	0.910	0.19	2.28
SSC #47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	11.793	13.890	-6.966	0.630	0.14	1.26
SSC #48	SSC:26	Welded Cover Plate	7.902	8.910	-3.348	0.610	0.28	0.42
SSC #49	SSC:27	Double Lapped Plate with Plug Welds	7.293	8.240	-3.146	0.580	0.23	0.27
SSC #50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	9.391	10.980	-5.277	0.540	0.14	0.72
SSC #51	SSC:28	Baseplate with Circular Hole	13.458	15.790	-7.746	0.810	0.17	1.76
SSC #52	SSC:30	Long Finite Plate Attchmnt: Axial	8.299	9.250	-3.159	0.310	0.47	0.57
SSC #53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.366	10.380	-3.368	0.100	0.75	1.15
SSC #54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	8.121	9.430	-4.348	0.620	0.14	0.45
SSC #55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	8.211	9.250	-3.453	0.440	0.31	0.51
SSC #56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	8.706	9.970	-4.200	0.430	0.21	0.62
SSC #57	SSC:32B	Abrupt Change in Flange Width:Bndg	7.406	8.470	-3.533	0.620	0.17	0.3
SSC #58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	7.758	8.860	-3.660	0.500	0.19	0.38
SSC #59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	14.849	17.970	-10.368	0.810	0.09	1.43
SSC #60	SSC:35	Butt Weld with Backing Bar	9.044	10.190	-3.808	0.280	0.36	0.82
SSC #61	SSC:36	Skip Welded Plates with Rathole	11.793	13.890	-6.966	0.630	0.14	1.26
SSC #62	SSC:36A	Skip Welded Plates	10.406	11.960	-5.163	0.460	0.23	1.16
SSC #63	SSC:38	Stiffener Plate Penetration: Bndg	8.408	9.450	-3.462	0.360	0.35	0.59
SSC #64	SSC:38(S)	Stiffener Plate Penetration: Shear	12.552	15.630	-10.225	0.880	0.06	0.87
SSC #65	SSC:40	Stiffener Intersection: Bending	7.406	8.470	-3.533	0.620	0.17	0.3
SSC #66	SSC:42	Bending of Long Attachment	13.105	15.320	-7.358	0.830	0.18	1.75
SSC #67	SSC:46	Long. Welds on Support Gussets: Axial	8.121	9.430	-4.348	0.620	0.14	0.45
SSC #68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.641	10.790	-3.818	0.070	0.51	1.17
SSC #69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	9.643	10.860	-4.042	0.190	0.41	1.09
GENERIC	Generic S/N Curve		9.000	9.903	-3.000	0.000	1	1

Table J-5 – Mean Minus 2 Sigma Strength Ratios Sorted at 10^3 Cycles

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Arng	B	STD DEV	10^3 cyc	10^8 cyc
SSC #64	SSC:38(S)	Stiffener Plate Penetration: Shear	12.552	15.630	-10.225	0.880	0.06	0.87
SSC #40	SSC:21(3/8"WELD)	Plate Penetration: Bending	19.586	24.250	-15.494	0.620	0.07	1.49
SSC #35	SSC:19	Lapped Flatbar End Weld Only: Axial	11.081	13.330	-7.472	0.930	0.09	0.91
SSC #59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	14.849	17.970	-10.368	0.810	0.09	1.43
SSC #34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	13.741	16.520	-9.233	0.750	0.1	1.36
SSC #36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	11.706	13.970	-7.520	0.930	0.11	1.09
SSC #38	SSC:20(S)	Plate Penetration: Shear	10.835	12.870	-6.759	0.930	0.11	0.96
SSC #39	SSC:21(1/4"WELD)	Plate Penetration: Bending	21.192	25.480	-14.245	0.620	0.11	2.33
SSC #15	SSC:9	Riveted Single Lap	14.887	17.790	-9.643	0.900	0.12	1.66
SSC #28	SSC:16(G)	Partial Pen. Butt Weld: Ground	11.555	13.650	-6.960	0.950	0.13	1.17
SSC #30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.650	0.13	1.37
SSC #32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.650	0.13	1.37
BS5400 #9	BS5400 S/N CURVE: S	Shear connectors in concrete	13.205	15.614	-8.000	0.504	0.14	1.53
SSC #16	SSC:10M	Butt Weld Axial:Mild Steel	12.585	14.870	-7.589	0.880	0.14	1.4
SSC #17	SSC:10H	Butt Weld Axial:HSLA Steel	20.148	24.000	-12.795	0.960	0.14	2.56
SSC #33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	7.748	8.960	-4.027	0.650	0.14	0.37
SSC #47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	11.793	13.890	-6.966	0.630	0.14	1.26
SSC #50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	9.391	10.980	-5.277	0.540	0.14	0.72
SSC #54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	8.121	9.430	-4.348	0.620	0.14	0.45
SSC #61	SSC:36	Skip Welded Plates with Rathole	11.793	13.890	-6.966	0.630	0.14	1.26
SSC #67	SSC:46	Long. Welds on Support Gussets: Axial	8.121	9.430	-4.348	0.620	0.14	0.45
SSC #45	SSC:25	Continuous Cruciform	12.096	14.230	-7.090	0.780	0.15	1.35
SSC #2	SSC:1M	Baseplate Mild Steel	20.259	23.940	-12.229	0.710	0.16	2.94
SSC #25	SSC:14	Disc. Cruciform Axial	12.901	15.140	-7.439	0.910	0.16	1.6
SSC #37	SSC:20	Plate Penetration: Axial	8.860	10.250	-4.619	0.660	0.16	0.63
SSC #3	SSC:1H	Baseplate HSLA Steel	25.569	30.220	-15.449	0.910	0.17	3.66
SSC #51	SSC:28	Baseplate with Circular Hole	13.458	15.790	-7.746	0.810	0.17	1.76
SSC #57	SSC:32B	Abrupt Change in Flange Width:Bndg	7.406	8.470	-3.533	0.620	0.17	0.3
SSC #65	SSC:40	Stiffener Intersection: Bending	7.406	8.470	-3.533	0.620	0.17	0.3
SSC #21	SSC:11	I-Bm Butt Weld Bndg	10.675	12.410	-5.765	0.680	0.18	1.12
SSC #41	SSC:21(S)	Plate Penetration: Shear	13.105	15.320	-7.358	0.830	0.18	1.75
SSC #66	SSC:42	Bending of Long Attachment	13.105	15.320	-7.358	0.830	0.18	1.75
SSC #19	SSC:10(G)	Butt Weld Axial:Ground	12.904	15.050	-7.130	0.940	0.19	1.74
SSC #46	SSC:25A	Plate with Transv. Side Attachment	15.086	17.650	-8.518	0.910	0.19	2.28
SSC #58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	7.758	8.860	-3.660	0.500	0.19	0.38
SSC #26	SSC:15	Loaded Edge Attachment Plate	8.706	9.970	-4.200	0.430	0.21	0.62
SSC #56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	8.706	9.970	-4.200	0.430	0.21	0.62
SSC #8	SSC:3(G)	Ground Long. Seam	12.122	14.040	-6.370	0.740	0.22	1.65
SSC #27	SSC:16	Partial Pen. Butt Weld	9.466	10.860	-4.631	0.580	0.22	0.85
SSC #23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	11.215	12.920	-5.663	0.600	0.23	1.43
SSC #49	SSC:27	Double Lapped Plate with Plug Welds	7.293	8.240	-3.146	0.580	0.23	0.27
SSC #62	SSC:36A	Skip Welded Plates	10.406	11.960	-5.163	0.460	0.23	1.16
SSC #7	SSC:3	Longitudinal Seam	11.750	13.540	-5.946	0.630	0.24	1.62
SSC #9	SSC:4	Long. Fillet Weld Bndg	11.295	13.000	-5.663	0.610	0.24	1.47
SSC #11	SSC:6	Dbl I-Bm Bndg	11.295	13.000	-5.663	0.610	0.24	1.47

Table J-5 – Mean Minus 2 Sigma Strength Ratios Sorted at 10^3 Cycles (cont.)

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Arng)	B	STD DEV	10^3 cyc	10^8 cyc
SSC #20	SSC:10A	Butt Weld Bndg	10.914	12.560	-5.468	0.790	0.24	1.33
NSWC #14	HS misaligned cruciform	Half thickness misalignment, full penetration	12.618	14.549	-6.416	0.142	0.25	1.94
SSC #14	SSC:8	Bolted Double Lap	12.849	14.820	-6.549	0.810	0.25	2.02
NSWC #17	OS misaligned cruciform	Half thickness misalignment, full penetration	10.243	11.725	-4.924	0.149	0.26	1.15
SSC #18	SSC:10Q	Butt Weld Axial:Q&T Steel	10.588	12.130	-5.124	0.760	0.26	1.27
SSC #10	SSC:5	Cvr Plt on I-Bm Flg Bndg	7.703	8.690	-3.278	0.480	0.27	0.37
SSC #22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	9.506	10.830	-4.398	0.430	0.27	0.92
SSC #13	SSC:7P	I-Bm w/vrt Web St Prin Stress	9.184	10.440	-4.172	0.510	0.28	0.81
SSC #48	SSC:26	Welded Cover Plate	7.902	8.910	-3.348	0.610	0.28	0.42
SSC #29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	8.585	9.710	-3.736	0.340	0.29	0.63
SSC #55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	8.211	9.250	-3.453	0.440	0.31	0.51
NSWC #11	HSLA misaligned partial penetration welds	Half thickness misalignment, partial penetration	8.097	9.105	-3.349	0.208	0.32	0.48
EURO #14	EUROCODE S/N CURVE: 98 (36)	threaded connections, thick cover plates	7.556	8.459	-3.000	n/a	0.33	0.33
SSC #6	SSC:2	Rolled I-Beam Bending	12.719	14.540	-6.048	0.640	0.33	2.28
SSC #31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	8.317	9.360	-3.465	0.390	0.33	0.55
NSWC #20	HSLA INTERCOASTAL	Discontinuous bulkhead penetration, R=0	9.459	10.690	-4.088	0.120	0.35	0.97
SSC #1	SSC:1(all steels)	Baseplate	12.325	14.050	-5.729	0.750	0.35	2.19
SSC #63	SSC:38	Stiffener Plate Penetration: Bndg	8.408	9.450	-3.462	0.360	0.35	0.59
NSWC #9	HSLA misaligned cruciform	Half thickness misalignment, full penetration	9.279	10.468	-3.949	0.227	0.36	0.91
SSC #60	SSC:35	Butt Weld with Backing Bar	9.044	10.190	-3.808	0.280	0.36	0.82
NSWC #23	HSLA Opening Detail	Reinforced opening detail	8.517	9.565	-3.480	0.203	0.37	0.63
EURO #13	EUROCODE S/N CURVE: 109 (40)	Circular hollow welded connections w/ intermediate plt	7.695	8.598	-3.000	n/a	0.37	0.37
SSC #12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	9.035	10.170	-3.771	0.530	0.37	0.82
BS5400 #1	BS5400 S/N CURVE: W	Weld throat based stresses	7.782	8.685	-3.000	0.184	0.39	0.39
DNV #8	DnV S/N CURVE: W	Partial penetration load carrying welds	7.779	8.682	-3.000	0.185	0.39	0.39
SSC #24	SSC:13	Tee Stiffener Taped Flg Width Bndg	9.947	11.220	-4.229	0.450	0.4	1.22
EURO #12	EUROCODE S/N CURVE: 122 (45)	Overlapped welds,	7.841	8.744	-3.000	n/a	0.41	0.41
SSC #69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	9.643	10.860	-4.042	0.190	0.41	1.09
NSWC #26	HSLA Insert Plate "Poor Weld"	Lack of fusion defects in weld	9.639	10.845	-4.009	0.103	0.42	1.10
SSC #5	SSC:1(F)	Baseplate Flame Cut	11.134	12.580	-4.805	0.600	0.43	1.82
NSWC #19	HSLA SNIPED COMP	Cont. bhd penetration with sniped bhd stiffener, R=0	9.780	10.989	-4.016	0.139	0.45	1.19
NSWC #25	HSLA Insert Plate "Good Weld"	Half thickness insert plate	11.733	13.265	-5.090	0.184	0.45	2.16
NSWC #28	HSLA single thickness doubler welds	Doubler plate, same thickness doubler	8.199	9.139	-3.122	0.490	0.46	0.53
BS5400 #2	BS5400 S/N CURVE: G	Flange attachments close to edge, undercut	7.980	8.883	-3.000	0.179	0.46	0.46
DNV #7	DnV S/N CURVE: G	Flange attachments close to edge, undercut	7.976	8.879	-3.000	0.179	0.46	0.46
EURO #11	EUROCODE S/N CURVE: 136 (50)	Long attachments, thin cover plates	7.983	8.886	-3.000	n/a	0.46	0.46
SSC #4	SSC:1Q	Baseplate Q & T Steel	11.985	13.550	-5.199	0.680	0.46	2.32
SSC #52	SSC:30	Long Finite Plate Attchmnt: Axial	8.299	9.250	-3.159	0.310	0.47	0.57
NSWC #2	HSLA 1/4", continuous cruc., shipyard	Full penetration non-load carrying welds	10.014	11.244	-4.087	0.350	0.48	1.33
NSWC #12	HS continuous cruciform	Full penetration non-load carrying welds	10.853	12.203	-4.486	0.218	0.50	1.79
NSWC #29	HSLA double thickness doubler welds	Doubler plate, twice thickness doubler	7.733	8.570	-2.780	0.555	0.51	0.38
AASHTO #5	AASHTO S/N CURVE: E	Weld terminations and overlaps	8.128	9.031	-3.000	0.101	0.51	0.51
EURO #10	EUROCODE S/N CURVE: 152 (56)	Rect. hollow welded connections	8.128	9.031	-3.000	n/a	0.51	0.51
SSC #68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.641	10.790	-3.818	0.070	0.51	1.17
NSWC #16	OS discontinuous cruciform	Full penetration load carrying welds	9.577	10.706	-3.752	0.304	0.53	1.15
NSWC #22	HSLA Stiffener Splice	Stiffener transition detail	10.489	11.768	-4.250	0.177	0.53	1.62

Table J-5 – Mean Minus 2 Sigma Strength Ratios Sorted at 10^3 Cycles (cont.)

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Amg	B	STD DEV	10^3 cyc	10^8 cyc
SSC #42	SSC:22	Tee with Stud Attachment: Bndg	8.453	9.400	-3.147	0.320	0.53	0.64
BS5400 #3	BS5400 S/N CURVE: F2	Transverse fillet welds at high SCF areas	8.217	9.120	-3.000	0.228	0.55	0.55
DNV #6	DnV S/N CURVE: F2	Butts in unequal width plates, long attachments	8.216	9.120	-3.000	0.228	0.55	0.55
NSWC #15	OS continuous cruciform	Full penetration non-load carrying welds	10.124	11.324	-3.987	0.221	0.57	1.46
NSWC #18	HSLA & HS conventional components	Continuous bulkhead penetration, R=0	8.764	9.746	-3.263	0.214	0.57	0.78
EURO #9	EUROCODE S/N CURVE: 171 (63)	Overlapped welds,	8.281	9.184	-3.000	n/a	0.58	0.58
NSWC #13	HS discontinuous cruciform	Full penetration load carrying welds	9.144	10.173	-3.417	0.252	0.61	0.97
SSC #43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.721	9.680	-3.187	0.130	0.61	0.77
SSC #44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.721	9.680	-3.187	0.130	0.61	0.77
NSWC #4	HSLA 7/16", continuous cruc., shipyard	Full penetration non-load carrying welds	10.012	11.172	-3.855	0.210	0.62	1.44
BS5400 #4	BS5400 S/N CURVE: F	Backing strip welds & flange attachments	8.384	9.287	-3.000	0.218	0.62	0.62
DNV #5	DnV S/N CURVE: F	Backing strip welds & short flange attachments	8.383	9.286	-3.000	0.218	0.62	0.62
AASHTO #4	AASHTO S/N CURVE: D	Non-NDE full penetration butt welds, attachments	8.433	9.336	-3.000	0.108	0.65	0.65
EURO #8	EUROCODE S/N CURVE: 193 (71)	Weld terminations, backing bar, thick trans. attchmt	8.439	9.342	-3.000	n/a	0.65	0.65
NSWC #6	HSLA 3/4", continuous cruc., shipyard	Full penetration non-load carrying welds	8.713	9.656	-3.134	0.172	0.66	0.77
NSWC #8	HSLA discontinuous cruciform	Full penetration load carrying welds	9.075	10.071	-3.307	0.263	0.67	0.96
BS5400 #8	BS5400 S/N CURVE: B	Parent plate, as welded	10.447	11.651	-4.000	0.182	0.67	1.76
DNV #1	DnV S/N CURVE: B	base plate or dressed welds	10.449	11.653	-4.000	0.182	0.67	1.76
NSWC #5	HSLA 7/16", continuous cruc., lab & syd	Full penetration non-load carrying welds	9.537	10.589	-3.496	0.205	0.71	1.23
NSWC #1	HSLA 7/16" bending, shipyard	Full penetration non-load carrying welds	12.861	14.405	-5.130	0.378	0.72	3.53
BS5400 #5	BS5400 S/N CURVE: E	Butts in unequal thickness & width, web brackets	8.597	9.500	-3.000	0.251	0.73	0.73
DNV #4	DnV S/N CURVE: E	Butts in unequal thickness & width, dressed welds	8.597	9.500	-3.000	0.251	0.73	0.73
EURO #7	EUROCODE S/N CURVE: 217 (80)	Intermittent long. Welds, short thin attachments	8.592	9.495	-3.000	n/a	0.73	0.73
NSWC #10	HSLA non-full penetration disc cruciform	Partial penetration load carrying welds	7.994	8.803	-2.686	0.139	0.74	0.47
NSWC #21	HSLA CONV CMP R=-1	Continuous bulkhead penetration	9.089	10.061	-3.230	0.169	0.75	0.99
SSC #53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.366	10.380	-3.368	0.100	0.75	1.15
BS5400 #7	BS5400 S/N CURVE: C	Flame-cut edges and longitudinal welds	9.638	10.691	-3.500	0.204	0.76	1.31
DNV #2	DnV S/N CURVE: C	Flame cut edge or cont. butt & fillet welds	9.639	10.692	-3.500	0.204	0.76	1.31
NSWC #27	HSLA one sided welds	Permanent backing bar, one sided weld	9.342	10.335	-3.298	0.307	0.82	1.16
DNV #9	DnV S/N CURVE: T	Tubular joints	8.746	9.649	-3.000	0.248	0.82	0.82
EURO #6	EUROCODE S/N CURVE: 244 (90)	Tapered width & thickness, as-welded	8.744	9.648	-3.000	n/a	0.82	0.82
NSWC #3	HSLA 7/16", continuous cruciform	Full penetration non-load carrying welds	9.189	10.155	-3.210	0.185	0.83	1.07
AASHTO #3	AASHTO S/N CURVE: C	Transverse NDE full penetration butt welds	8.750	9.653	-3.000	0.063	0.83	0.83
BS5400 #6	BS5400 S/N CURVE: D	Transverse butt welds and start/stop in long	8.764	9.667	-3.000	0.210	0.83	0.83
DNV #3	DnV S/N CURVE: D	Butt & fillet welds with start/stop positions	8.764	9.667	-3.000	0.210	0.83	0.83
NSWC #7	HSLA 1", continuous cruc., shipyard	Full penetration non-load carrying welds	8.253	9.075	-2.732	0.068	0.86	0.59
EURO #5	EUROCODE S/N CURVE: 271 (100)	Manual butt & fillet welds and repairs	8.881	9.784	-3.000	n/a	0.91	0.91
NSWC #24	HSLA Flame cut edge	Flame cut edge	10.369	11.484	-3.705	0.092	0.92	1.91
GENERIC	Generic S/N Curve		9.000	9.903	-3.000	0.000	1	1
EURO #4	EUROCODE S/N CURVE: 304 (112)	Cont. long. fillet welds with start/stop, tapered ground	9.031	9.934	-3.000	n/a	1.02	1.02
EURO #3	EUROCODE S/N CURVE: 339 (125)	Flame cut edge, cont. long. fillet welds	9.173	10.076	-3.000	n/a	1.14	1.14
AASHTO #2	AASHTO S/N CURVE: B	Continuous Longitudinal Welds	9.178	10.081	-3.000	0.147	1.15	1.15
EURO #2	EUROCODE S/N CURVE: 380 (140)	Dressed cut edge, bolted connections	9.322	10.225	-3.000	n/a	1.28	1.28
EURO #1	EUROCODE S/N CURVE: 434 (160)	Baseplate	9.495	10.398	-3.000	n/a	1.46	1.46
AASHTO #1	AASHTO S/N CURVE: A	Baseplate dressed edges	9.499	10.402	-3.000	0.221	1.47	1.47

Table J-6 – Mean Minus 2 Sigma Strength Ratios Sorted at 10^8 Cycles

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Arng	B	STD DEV	10^3 cyc	10^8 cyc
SSC #49	SSC:27	Double Lapped Plate with Plug Welds	7.293	8.240	-3.146	0.580	0.23	0.27
SSC #57	SSC:32B	Abrupt Change in Flange Width:Bndg	7.406	8.470	-3.533	0.620	0.17	0.3
SSC #65	SSC:40	Stiffener Intersection: Bending	7.406	8.470	-3.533	0.620	0.17	0.3
EURO #14	EUROCODE S/N CURVE: 98 (36)	threaded connections, thick cover plates	7.556	8.459	-3.000	n/a	0.33	0.33
EURO #13	EUROCODE S/N CURVE: 109 (40)	Circular hollow welded connections w/ intermediate plt	7.695	8.598	-3.000	n/a	0.37	0.37
SSC #10	SSC:5	Cvr Plt on I-Bm Flg Bndg	7.703	8.690	-3.278	0.480	0.27	0.37
SSC #33	SSC:18	Lapped Flatbar to Plate Attchmnt:Axial	7.748	8.960	-4.027	0.650	0.14	0.37
NSWC #29	HSLA double thickness doubler welds	Doubler plate, twice thickness doubler	7.733	8.570	-2.780	0.555	0.51	0.38
SSC #58	SSC:33	Lapped Flatbar to Plt w/ Full Wrap:Axial	7.758	8.860	-3.660	0.500	0.19	0.38
BS5400 #1	BS5400 S/N CURVE: W	Weld throat based stresses	7.782	8.685	-3.000	0.184	0.39	0.39
DNV #8	DnV S/N CURVE: W	Partial penetration load carrying welds	7.779	8.682	-3.000	0.185	0.39	0.39
EURO #12	EUROCODE S/N CURVE: 122 (45)	Overlapped welds,	7.841	8.744	-3.000	n/a	0.41	0.41
SSC #48	SSC:26	Welded Cover Plate	7.902	8.910	-3.348	0.610	0.28	0.42
SSC #54	SSC:31	Out-of-Plane Flg Side Attchmnt: Bndg	8.121	9.430	-4.348	0.620	0.14	0.45
SSC #67	SSC:46	Long. Welds on Support Gussets: Axial	8.121	9.430	-4.348	0.620	0.14	0.45
BS5400 #2	BS5400 S/N CURVE: G	Flange attachments close to edge, undercut	7.980	8.883	-3.000	0.179	0.46	0.46
DNV #7	DnV S/N CURVE: G	Flange attachments close to edge, undercut	7.976	8.879	-3.000	0.179	0.46	0.46
EURO #11	EUROCODE S/N CURVE: 136 (50)	Long attachments, thin cover plates	7.983	8.886	-3.000	n/a	0.46	0.46
NSWC #10	HSLA non-full penetration disc cruciform	Partial penetration load carrying welds	7.994	8.803	-2.686	0.139	0.74	0.47
NSWC #11	HSLA misaligned partial penetration welds	Half thickness misalignment, partial penetration	8.097	9.105	-3.349	0.208	0.32	0.48
AASHTO #5	AASHTO S/N CURVE: E	Weld terminations and overlaps	8.128	9.031	-3.000	0.101	0.51	0.51
EURO #10	EUROCODE S/N CURVE: 152 (56)	Rect. hollow welded connections	8.128	9.031	-3.000	n/a	0.51	0.51
SSC #55	SSC:31A	Lapped Flng Side Attchmnt: Bndg	8.211	9.250	-3.453	0.440	0.31	0.51
NSWC #28	HSLA single thickness doubler welds	Doubler plate, same thickness doubler	8.199	9.139	-3.122	0.490	0.46	0.53
BS5400 #3	BS5400 S/N CURVE: F2	Transverse fillet welds at high SCF areas	8.217	9.120	-3.000	0.228	0.55	0.55
DNV #6	DnV S/N CURVE: F2	Butts in unequal width plates, long attachments	8.216	9.120	-3.000	0.228	0.55	0.55
SSC #31	SSC:17A	Lapped Channel to Plate Attchmnt:Axial	8.317	9.360	-3.465	0.390	0.33	0.55
SSC #52	SSC:30	Long Finite Plate Attchmnt: Axial	8.299	9.250	-3.159	0.310	0.47	0.57
EURO #9	EUROCODE S/N CURVE: 171 (63)	Overlapped welds,	8.281	9.184	-3.000	n/a	0.58	0.58
NSWC #7	HSLA 1", continuous cruc., shipyard	Full penetration non-load carrying welds	8.253	9.075	-2.732	0.068	0.86	0.59
SSC #63	SSC:38	Stiffener Plate Penetration: Bndg	8.408	9.450	-3.462	0.360	0.35	0.59
BS5400 #4	BS5400 S/N CURVE: F	Backing strip welds & flange attachments	8.384	9.287	-3.000	0.218	0.62	0.62
DNV #5	DnV S/N CURVE: F	Backing strip welds & short flange attachments	8.383	9.286	-3.000	0.218	0.62	0.62
SSC #26	SSC:15	Loaded Edge Attachment Plate	8.706	9.970	-4.200	0.430	0.21	0.62
SSC #56	SSC:32A	In-Plane Side Attchmnt to Flange: Bndg	8.706	9.970	-4.200	0.430	0.21	0.62
NSWC #23	HSLA Opening Detail	Reinforced opening detail	8.517	9.565	-3.480	0.203	0.37	0.63
SSC #29	SSC:17	Lapped Angle to Plate Attchmnt:Axial	8.585	9.710	-3.736	0.340	0.29	0.63
SSC #37	SSC:20	Plate Penetration: Axial	8.860	10.250	-4.619	0.660	0.16	0.63
SSC #42	SSC:22	Tee with Stud Attachment: Bndg	8.453	9.400	-3.147	0.320	0.53	0.64
AASHTO #4	AASHTO S/N CURVE: D	Non-NDE full penetration butt welds, attachments	8.433	9.336	-3.000	0.108	0.65	0.65
EURO #8	EUROCODE S/N CURVE: 193 (71)	Weld terminations, backing bar, thick trans. attchmt	8.439	9.342	-3.000	n/a	0.65	0.65
SSC #50	SSC:27(S)	Double Lapped Plt w/ Plug Welds: Shear	9.391	10.980	-5.277	0.540	0.14	0.72
BS5400 #5	BS5400 S/N CURVE: E	Butts in unequal thickness & width, web brackets	8.597	9.500	-3.000	0.251	0.73	0.73
DNV #4	DnV S/N CURVE: E	Butts in unequal thickness & width, dressed welds	8.597	9.500	-3.000	0.251	0.73	0.73
EURO #7	EUROCODE S/N CURVE: 217 (80)	Intermittent long. Welds, short thin attachments	8.592	9.495	-3.000	n/a	0.73	0.73

Table J-6 – Mean Minus 2 Sigma Strength Ratios Sorted at 10^8 Cycles (cont.)

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Arng)	B	STD DEV	10^3 cyc	10^8 cyc
NSWC #6	HSLA 3/4", continuous cruc., shipyard	Full penetration non-load carrying welds	8.713	9.656	-3.134	0.172	0.66	0.77
SSC #43	SSC:23	Tee with Transv. Channel Attchmnt:Bndg	8.721	9.680	-3.187	0.130	0.61	0.77
SSC #44	SSC:24	Tee with Short Cvr Plt Attchmnt:Bndg	8.721	9.680	-3.187	0.130	0.61	0.77
NSWC #18	HSLA & HS conventional components	Continuous bulkhead penetration, R=0	8.764	9.746	-3.263	0.214	0.57	0.78
SSC #13	SSC:7P	I-Bm w/vrt Web St Prin Stress	9.184	10.440	-4.172	0.510	0.28	0.81
DNV #9	DnV S/N CURVE: T	Tubular joints	8.746	9.649	-3.000	0.248	0.82	0.82
EURO #6	EUROCODE S/N CURVE: 244 (90)	Tapered width & thickness, as-welded	8.744	9.648	-3.000	n/a	0.82	0.82
SSC #12	SSC:7B	I-Bm w/vrt Web Stiff Bndg	9.035	10.170	-3.771	0.530	0.37	0.82
SSC #60	SSC:35	Butt Weld with Backing Bar	9.044	10.190	-3.808	0.280	0.36	0.82
AASHTO #3	AASHTO S/N CURVE: C	Transverse NDE full penetration butt welds	8.750	9.653	-3.000	0.063	0.83	0.83
BS5400 #6	BS5400 S/N CURVE: D	Transverse butt welds and start/stop in long	8.764	9.667	-3.000	0.210	0.83	0.83
DNV #3	DnV S/N CURVE: D	Butt & fillet welds with start/stop positions	8.764	9.667	-3.000	0.210	0.83	0.83
SSC #27	SSC:16	Partial Pen. Butt Weld	9.466	10.860	-4.631	0.580	0.22	0.85
SSC #64	SSC:38(S)	Stiffener Plate Penetration: Shear	12.552	15.630	-10.225	0.880	0.06	0.87
NSWC #9	HSLA misaligned cruciform	Half thickness misalignment, full penetration	9.279	10.468	-3.949	0.227	0.36	0.91
EURO #5	EUROCODE S/N CURVE: 271 (100)	Manual butt & fillet welds and repairs	8.881	9.784	-3.000	n/a	0.91	0.91
SSC #35	SSC:19	Lapped Flatbar End Weld Only: Axial	11.081	13.330	-7.472	0.930	0.09	0.91
SSC #22	SSC:12	Tee Stffnr Tapered Flg Thickness Bndg	9.506	10.830	-4.398	0.430	0.27	0.92
NSWC #8	HSLA discontinuous cruciform	Full penetration load carrying welds	9.075	10.071	-3.307	0.263	0.67	0.96
SSC #38	SSC:20(S)	Plate Penetration: Shear	10.835	12.870	-6.759	0.930	0.11	0.96
NSWC #13	HS discontinuous cruciform	Full penetration load carrying welds	9.144	10.173	-3.417	0.252	0.61	0.97
NSWC #20	HSLA INTERCOASTAL	Discontinuous bulkhead penetration, R=0	9.459	10.690	-4.088	0.120	0.35	0.97
NSWC #21	HSLA CONV CMP R=-1	Continuous bulkhead penetration	9.089	10.061	-3.230	0.169	0.75	0.99
GENERIC	Generic S/N Curve		9.000	9.903	-3.000	0.000	1	1
EURO #4	EUROCODE S/N CURVE: 304 (112)	Cont. long. fillet welds with start/stop, tapered ground	9.031	9.934	-3.000	n/a	1.02	1.02
NSWC #3	HSLA 7/16", continuous cruciform	Full penetration non-load carrying welds	9.189	10.155	-3.210	0.185	0.83	1.07
SSC #36	SSC:19(S)	Lapped Flatbar End Weld Only: Shear	11.706	13.970	-7.520	0.930	0.11	1.09
SSC #69	SSC:52(V)	Transv. Stiffnr Pene. Flg Supported: Bndg	9.643	10.860	-4.042	0.190	0.41	1.09
NSWC #26	HSLA Insert Plate "Poor Weld"	Lack of fusion defects in weld	9.639	10.845	-4.009	0.103	0.42	1.10
SSC #21	SSC:11	I-Bm Butt Weld Bndg	10.675	12.410	-5.765	0.680	0.18	1.12
EURO #3	EUROCODE S/N CURVE: 339 (125)	Flame cut edge, cont. long. fillet welds	9.173	10.076	-3.000	n/a	1.14	1.14
NSWC #16	OS discontinuous cruciform	Full penetration load carrying welds	9.577	10.706	-3.752	0.304	0.53	1.15
NSWC #17	OS misaligned cruciform	Half thickness misalignment, full penetration	10.243	11.725	-4.924	0.149	0.26	1.15
AASHTO #2	AASHTO S/N CURVE: B	Continuous Longitudinal Welds	9.178	10.081	-3.000	0.147	1.15	1.15
SSC #53	SSC:30A	Long Finite Plate Attchmnt: Bndg	9.366	10.380	-3.368	0.100	0.75	1.15
NSWC #27	HSLA one sided welds	Permanent backing bar, one sided weld	9.342	10.335	-3.298	0.307	0.82	1.16
SSC #62	SSC:36A	Skip Welded Plates	10.406	11.960	-5.163	0.460	0.23	1.16
SSC #28	SSC:16(G)	Partial Pen. Butt Weld: Ground	11.555	13.650	-6.960	0.950	0.13	1.17
SSC #68	SSC:51(V)	Transv. Stiffnr Pene. Flg Unspprtd: Bndg	9.641	10.790	-3.818	0.070	0.51	1.17
NSWC #19	HSLA SNIPED COMP	Cont. bhd penetration with sniped bhd stiffener, R=0	9.780	10.989	-4.016	0.139	0.45	1.19
SSC #24	SSC:13	Tee Stiffener Taped Flg Width Bndg	9.947	11.220	-4.229	0.450	0.4	1.22
NSWC #5	HSLA 7/16", continuous cruc., lab & syd	Full penetration non-load carrying welds	9.537	10.589	-3.496	0.205	0.71	1.23
SSC #47	SSC:25B	Plt w/ Transv. Side Attchmnt and Brace	11.793	13.890	-6.966	0.630	0.14	1.26
SSC #61	SSC:36	Skip Welded Plates with Rathole	11.793	13.890	-6.966	0.630	0.14	1.26
SSC #18	SSC:10Q	Butt Weld Axial:Q&T Steel	10.588	12.130	-5.124	0.760	0.26	1.27
EURO #2	EUROCODE S/N CURVE: 380 (140)	Dressed cut edge, bolted connections	9.322	10.225	-3.000	n/a	1.28	1.28

Table J-6 – Mean Minus 2 Sigma Strength Ratios Sorted at 10^8 Cycles (cont.)

	BASELINE CONFIGURATION	BRIEF DESCRIPTION	LOG(Aamp)	LOG(Amg	B	STD DEV	10^3 cyc	10^8 cyc
BS5400 #7	BS5400 S/N CURVE: C	Flame-cut edges and longitudinal welds	9.638	10.691	-3.500	0.204	0.76	1.31
DNV #2	DnV S/N CURVE: C	Flame cut edge or cont. butt & fillet welds	9.639	10.692	-3.500	0.204	0.76	1.31
NSWC #2	HSLA 1/4", continuous cruc., shipyard	Full penetration non-load carrying welds	10.014	11.244	-4.087	0.350	0.48	1.33
SSC #20	SSC:10A	Butt Weld Bndg	10.914	12.560	-5.468	0.790	0.24	1.33
SSC #45	SSC:25	Continuous Cruciform	12.096	14.230	-7.090	0.780	0.15	1.35
SSC #34	SSC:18(S)	Lapped Flatbar to Plate Attchmnt:Shear	13.741	16.520	-9.233	0.750	0.1	1.36
SSC #30	SSC:17(S)	Lapped Angle to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.650	0.13	1.37
SSC #32	SSC:17A(S)	Lapped Channel to Plate Attchmnt:Shear	12.637	14.980	-7.782	0.650	0.13	1.37
SSC #16	SSC:10M	Butt Weld Axial:Mild Steel	12.585	14.870	-7.589	0.880	0.14	1.4
SSC #23	SSC:12(G)	Tee Stffnr Tapered Flg Thickness Bndg	11.215	12.920	-5.663	0.600	0.23	1.43
SSC #59	SSC:33(S)	Lapped Flatbar to Plt w/ Full Wrap:Shear	14.849	17.970	-10.368	0.810	0.09	1.43
NSWC #4	HSLA 7/16", continuous cruc., shipyard	Full penetration non-load carrying welds	10.012	11.172	-3.855	0.210	0.62	1.44
NSWC #15	OS continuous cruciform	Full penetration non-load carrying welds	10.124	11.324	-3.987	0.221	0.57	1.46
EURO #1	EUROCODE S/N CURVE: 434 (160)	Baseplate	9.495	10.398	-3.000	n/a	1.46	1.46
AASHTO #1	AASHTO S/N CURVE: A	Baseplate dressed edges	9.499	10.402	-3.000	0.221	1.47	1.47
SSC #9	SSC:4	Long. Fillet Weld Bndg	11.295	13.000	-5.663	0.610	0.24	1.47
SSC #11	SSC:6	Dbl I-Bm Bndg	11.295	13.000	-5.663	0.610	0.24	1.47
SSC #40	SSC:21(3/8"WELD)	Plate Penetration: Bending	19.586	24.250	-15.494	0.620	0.07	1.49
BS5400 #9	BS5400 S/N CURVE: S	Shear connectors in concrete	13.205	15.614	-8.000	0.504	0.14	1.53
SSC #25	SSC:14	Disc. Cruciform Axial	12.901	15.140	-7.439	0.910	0.16	1.6
NSWC #22	HSLA Stiffener Splice	Stiffener transition detail	10.489	11.768	-4.250	0.177	0.53	1.62
SSC #7	SSC:3	Longitudinal Seam	11.750	13.540	-5.946	0.630	0.24	1.62
SSC #8	SSC:3(G)	Ground Long. Seam	12.122	14.040	-6.370	0.740	0.22	1.65
SSC #15	SSC:9	Riveted Single Lap	14.887	17.790	-9.643	0.900	0.12	1.66
SSC #19	SSC:10(G)	Butt Weld Axial:Ground	12.904	15.050	-7.130	0.940	0.19	1.74
SSC #41	SSC:21(S)	Plate Penetration: Shear	13.105	15.320	-7.358	0.830	0.18	1.75
SSC #66	SSC:42	Bending of Long Attachment	13.105	15.320	-7.358	0.830	0.18	1.75
BS5400 #8	BS5400 S/N CURVE: B	Parent plate, as welded	10.447	11.651	-4.000	0.182	0.67	1.76
DNV #1	DnV S/N CURVE: B	base plate or dressed welds	10.449	11.653	-4.000	0.182	0.67	1.76
SSC #51	SSC:28	Baseplate with Circular Hole	13.458	15.790	-7.746	0.810	0.17	1.76
NSWC #12	HS continuous cruciform	Full penetration non-load carrying welds	10.853	12.203	-4.486	0.218	0.50	1.79
SSC #5	SSC:1(F)	Baseplate Flame Cut	11.134	12.580	-4.805	0.600	0.43	1.82
NSWC #24	HSLA Flame cut edge	Flame cut edge	10.369	11.484	-3.705	0.092	0.92	1.91
NSWC #14	HS misaligned cruciform	Half thickness misalignment, full penetration	12.618	14.549	-6.416	0.142	0.25	1.94
SSC #14	SSC:8	Bolted Double Lap	12.849	14.820	-6.549	0.810	0.25	2.02
NSWC #25	HSLA Insert Plate "Good Weld"	Half thickness insert plate	11.733	13.265	-5.090	0.184	0.45	2.16
SSC #1	SSC:1(all steels)	Baseplate	12.325	14.050	-5.729	0.750	0.35	2.19
SSC #6	SSC:2	Rolled I-Beam Bending	12.719	14.540	-6.048	0.640	0.33	2.28
SSC #46	SSC:25A	Plate with Transv. Side Attachment	15.086	17.650	-8.518	0.910	0.19	2.28
SSC #4	SSC:1Q	Baseplate Q & T Steel	11.985	13.550	-5.199	0.680	0.46	2.32
SSC #39	SSC:21(1/4"WELD)	Plate Penetration: Bending	21.192	25.480	-14.245	0.620	0.11	2.33
SSC #17	SSC:10H	Butt Weld Axial:HSLA Steel	20.148	24.000	-12.795	0.960	0.14	2.56
SSC #2	SSC:1M	Baseplate Mild Steel	20.259	23.940	-12.229	0.710	0.16	2.94
NSWC #1	HSLA 7/16" bending, shipyard	Full penetration non-load carrying welds	12.861	14.405	-5.130	0.378	0.72	3.53
SSC #3	SSC:1H	Baseplate HSLA Steel	25.569	30.220	-15.449	0.910	0.17	3.66

Table J-7 - Comparison of NSWCCD Data with AASHTO Curves

AASHTO Category	Mean 10^3	Mean 10^8	Mean-2S 10^3	Mean-2S 10^8
		#1 CC Bending #25 Insert (Good) #12 HS CC #14 HS MC #24 Flame Cut		#1 CC Bending #25 Insert (Good) #14 HS MC #24 Flame Cut #12 HS CC #22 Stiff Splice
A	A	A	A	A
		#22 Siff Splice #2 1/4" CC Syd #15 OS CC #4 HSLA CC Syd #27 One-sided Weld #16 OS DC #5 HSLA CC N&Syd		#15 OS CC #4 HSLA CC Syd #2 1/4" CC Syd #5 HSLA CC N&Syd #19 Sniped Comp #27 One-sided Weld
B	B	B	B	B
	#29 Double T Doubler #27 One-sided Weld #3 HSLA CC #24 Flame Cut #1 CC Bending #8 HSLA DC #21 HSLA Comp R=-1 #7 HSLA 1" Syd #28 Single T Doubler #10 HSLA PP DC #5 HSLA CC N&Syd	#3 HSLA CC #19 Sniped Comp #8 HSLA DC #13 HS DC #17 OS MC #21 HSLA Comp R=-1 #26 Insert (Poor) #9 HSLA MC #20 Intercostal Comp #28 Single T Doubler #18 HSLA & HS Comp #6 HSLA 3/4" Syd #29 Double T Doubler	#24 Flame Cut #7 HSLA 1" Syd	#17 OS MC #16 OS DC #26 Insert (Poor) #3 HSLA CC #21 HSLA Comp R=-1 #20 Intercostal Comp #13 HS DC #8 HSLA DC #9 HSLA MC
C	C	C	C	C
	#13 HS DC #6 HSLA 3/4" Syd #4 HSLA CC Syd #18 HSLA & HS Comp #16 OS DC	#23 Opening Detail	#3 HSLA CC #27 One-sided Weld #21 HSLA Comp R=-1 #10 HSLA PP DC #1 CC Bending #5 HSLA CC N&Syd #8 HSLA DC #6 HSLA 3/4" Syd	#18 HSLA & HS Comp #6 HSLA 3/4" Syd
D	D	D	D	D
	#15 OS CC #2 1/4" CC Syd #22 Stiff Splice #12 HS CC	#7 HSLA 1" Syd #11 HSLA PP MC	#4 HSLA CC Syd #13 HS DC #18 HSLA & HS Comp #15 OS CC #22 Stiff Splice #16 OS DC	#23 Opening Detail #7 HSLA 1" Syd #28 Single T Doubler
E	E	E	E	E
	#25 Insert (Good) #19 Sniped Comp #23 Opening Detail #26 Insert (Poor) #9 HSLA MC #11 HSLA PP MC #20 Intercostal Comp #17 OS MC #14 HS MC	#10 HSLA PP DC	#29 Double T Doubler #12 HS CC #2 1/4" CC Syd #28 Single T Doubler #25 Insert (Good) #19 Sniped Comp #26 Insert (Poor) #23 Opening Detail	#11 HSLA PP MC #10 HSLA PP DC #29 Double T Doubler
E'			E'	E'
			#9 HSLA MC #20 Intercostal Comp #11 HSLA PP MC #17 OS MC #14 HS MC	

Table J-8 - Categorization of NSWCCD Details with AASHTO Categories

Detail	Category	NSWCCD
Base metal, rolled shapes, machined ground flame cut edges	A	
Continuous longitudinal fillet welds Flush ground butt welds	B	
Transverse butt welds (inspected)	C	
uninspected butt welds	D	
with permanent backing bar	D	#27
Transverse butt joint with plates of unequal thickness and ...		
transition >= 2.5:1	C	#22
transition < 2.5:1	D	#25
Non-load carrying attachment		
shorter than 2"	C	
between 2" and 4" long	D	#18,#21
longer than 4" and < 1" thick	E	#28
longer than 4" and >= 1" thi	E'	#29
Cruciform joint		
loaded member continuous	C	#2, #3, #4, #5, #6, #7,#12,#15
loaded member discontinuo	C	#8,#13,#16,#20
Flame cut edge	C	#24
Transverse frame or floor at shell or deck	D	#19
Rat hole		
< 4" long	D	
>= 4" long	E	
Load carrying attachment < 1" thick		
<1" thick	E	
>= 1" thick	E'	
Weld terminations/interuptions		
intermittent welds	E	
weld overlaps	E	#23
welds with defects	E	#10,#26
misalignments	E	#9,#11,#14,#17

Appendix K

Thickness and Misalignment Effects on Fatigue Strength

Thickness and Misalignment Effects on Fatigue Strength

Values of thickness and out-of-plane misalignment can often be different for actual structures than they are for test specimens used to generate the fatigue design S/N curve. One way to account for these effects is to adjust the S/N curve to reflect the change in stress concentration.

Thickness effects can be addressed through the use of the following formula (Maddox, 1991). This formula was evaluated (Kihl et al, 1997) and found to account for the change in fatigue strength reasonably well.

$$\frac{S}{S_{ref}} = \sqrt[4]{\frac{t_{ref}}{t}}$$

If the thickness of a particular detail is different from the thickness of the detail tested, the effect of this change on fatigue strength can be quantified using the following example as a guide. Consider the conventional component data at R=-1, Detail #21, and the effect of increasing the thickness by a factor of three. The nominal thicknesses of the test components ranged from 3/16" for the plate and web to 1/4" for the flange. If these thicknesses were increased by a factor of three, the equation above become

$$\frac{S}{S_{ref}} = \sqrt[4]{\frac{t}{3t}} = \sqrt[4]{\frac{1}{3}} = 0.76$$

$$S_{ref} = 1.316S$$

The mean minus two sigma S/N curve for the "thin" (reference) components is of the following form with log(A)=9.089 and B=-3.230 in terms of stress amplitude in ksi.

$$N = 10^{9.089} S_{ref}^{-3.230}$$

Therefore, the mean minus two sigma S/N curve, in terms of stress amplitude, for the "thick" components would be

$$\begin{aligned} N &= 10^{9.089}(1.316 S_{ref}^{-3.230}) \\ &= 10^{8.704} S^{-3.230} \end{aligned}$$

The generic S/N curve is defined by coefficients log(A)=9.000 and B=-3, in terms of stress amplitude. The Rayleigh Approximation equation is rewritten in terms of the RMS stress, σ, so the fatigue strength corresponding to a given number of cycles can be determined.

$$N = \frac{10^{\log(A)}}{2^{-B/2}\sigma^{-B}\Gamma(1-B/2)}$$

or

$$\sigma = \left(\frac{10^{\log(A)}}{2^{-B/2}\Gamma(1-B/2)N}\right)^{-1/B}$$

Substituting both the "thick" component S/N curve coefficients and the generic (baseline) S/N curve coefficients into the Rayleigh Approximation equation results in fatigue strength ratios of 0.572 (a 24% decrease from 0.753 for the "thin" case) at 10^3 cycles and 0.752 (a 24% decrease from 0.990 for the "thin" case) at 10^8 cycles.

It is interesting to compare these results with the S/N curves from one of the design codes. For example, the "thin" components would be classified as an AASHTO

Category D detail in the low cycle regime, and a Category C detail in the high cycle regime. However, the "thick" components now reduce the fatigue strength to the point where they now are classified as a Category E detail in the low cycle regime, and a Category D in the high cycle regime.

Fatigue strength reductions due to simple misalignments can also be determined in much the same way as the changes in thickness. Stress concentration factors for misalignments in full penetration butt and cruciform welds can be determined from the following equation (Maddox, 1991).

$$SCF = 1 + \frac{6e}{t_1}\left[\frac{1}{1+\left(t_2/t_1\right)^{1.5}}\right]$$

In this equation, "e" represents the eccentricity due to the misalignment and is measured between the mid-fibers of each plate; "t_1" is the thickness of the thinner plate, and "t_2" is the thickness of the thicker plate. It should be noted that another form of this equation is also available (ABS, 1991), but the form given above is slightly more conservative in that it results in a slightly higher stress concentration factor.

If one considers the effect of equal thickness plates welded together, but offset by half the thickness, the stress concentration factor can be determined as 2.5. An aligned specimen (Detail #8) with the following mean S/N curve (log(A)=9.601 and B=-3.307) in terms of stress amplitude could be modified to account for the effect of the misalignment considered above.

$$N = 10^{9.601} S^{-3.307}$$

Applying the stress concentration factor due to the misalignment results in the following S/N curve.

$$N = 10^{9.601}(2.5S)^{-3.307} = 10^{8.285}S^{-3.307}$$

The same stress, S, applied to the misaligned joint could now be analyzed using the modified S/N curve (log(A)=8.285 and B=-3.307). The coefficients obtained above, when substituted into the Rayleigh Approximation formula, result in fatigue strength ratios (again using the generic S/N curve as a baseline for comparison) of 0.39 for the low cycle (10^3 cycle) regime and 0.55 for the high cycle (10^8 cycle) regime. Detail #9, a cruciform shaped joint actually misaligned by half the thickness and tested, had produced fatigue strength ratios of 0.47 for low cycle and 1.18 for high cycle. Although application of the SCF formula above produces a similar fatigue strength ratio in the low cycle regime, the predictions are quite conservative in the high cycle regime. Similar results are obtained using data from Details #13, #14, #16 and #17. The fatigue behavior is not entirely accounted for by simply applying a stress concentration factor. In reality, both S/N curve coefficients appear to be affected by the misalignment. A misalignment correction algorithm better than that given above has not yet been established, however the one provided at least appears to be conservative, if not accurate, when applied to available test data.